JPRS 75417

1 April 1980

China Report

AGRICULTURE

No. 76

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Indexes to this report (by keyword, author, personal names, title and series) are available from Bell & Howell, Old Mansfield Road, Wooster, Ohio 44691.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS 75417

1 April 1980

CHINA REPORT

AGRICULTURE

No. 76

CONTENTS

PAGE

I. GENERAL INFORMATION

NATIONAL

Professor Xiong Yi Stresses Developing Agriculture
(Yu Quanyu, Cai Mingzhao; REMIN RIBAO, 21 Jan 80)......... 1

Measures To Tap Energy Resources in Rural China Discussed
(Huang Zhijie, Xu Junzhang; GUANGMING RIBAO, 25 Jan 80)... 4

'RENMIN RIBAO' Commentator on Making Use of Natural Resources
(RENMIN RIBAO, 27 Feb 80).................................. 8

Migration Patterns of Brown Planthopper Studied
(Cheng Xianian, et al.; KUNCHONG XUEBAO, Feb 79).......... 11

Heritability of Economic Characteristics of Xian Rice Estimated
(Son Xuchu; ZHONGGUO NONGYE KEXUE, No 4, 1979)............ 50

New Farm Machines Produced
(NANFANG RIBAO, 12 Dec 79)................................. 59

Briefs
- Cattle Breeding Conference 60
- Sugar Production 60
- Commune-Run Enterprises 60
- Drinking-Water Wells 61
- Rice Research Institute 61

CONTENTS (Continued) Page

ANHUI

Briefs

Agricultural Drive Supported 62
Cotton Production Group 62
Dongzhi County Spring Farming 62
Reinforcement of Water Facilities 62

FUJIAN

Briefs

Grain Production 63
Afforestation Work 63

GUANGDONG

Nanhai County Leads in Making New Breakthrough in Agriculture
(Chen Mantian, Liang Fuqing; NANFANG RIBAO, 20 Feb 80).. 64

Mechanization of Rubber Production Urged
(NANFANG RIBAO, 12 Dec 79).......................... 68

Briefs

Chaoyang County Rice Production 71
Fanyu County Production 71
Agricultural Production 71

GUANGXI

Briefs

Spring Farming Conference 72
Spring Farming 72
Afforestation Projects 72
Afforestation Circular 73

HEBEI

Low Output of Small Chemical Fertilizer Plants Revealed
(BEIJING RIBAO, 10 Oct 79)........................... 74

Conferences, Discussions Held, by Zhao Hong
Reorganization Needed

Briefs
Rural Trade Fairs 78

HEILONGJIANG

Briefs
Irrigated Farmland 79
Agricultural Production 79
Cattle Raising 79
Afforestation Conference 79

HENAN

Briefs
Lushi County Afforestation 80
Dancheng County Grain Output 80
Xinxiang County Cotton Seeds 80

HUBEI

Briefs
Spring Farming 81

HUNAN

Briefs
Cotton Production 82
State Farms 82

JIANGSU

Briefs
Afforestation Conference 83
Aquatic Conference 83

JILIN

Briefs
Forest Protection Circular 84

LIAONING

Rice Crop Near Anshan Steel Center Polluted
(Lu Binzhan; RENMIN RIBAO, 11 Jan 80)................. 85

CONTENTS (Continued) Page

NEI MONGGOL

Briefs

Lamb Production 87

QINGHAI

Briefs

Barley Shortage 88

SHAANXI

Briefs

Chemical Fertilizer Production 89

SHANDONG

Briefs

Afforestation Meeting 90
Juancheng County Timber Production 90

SHANGHAI

Suburban Commune Produces Record Number of Eggs
(JIEFANG RIBAO, 21 Dec 79).............................. 91

Briefs

Tree Seedling Production 92
Agricultural Experts Meet 92
Agricultural Meeting 92

SHANXI

Shanxi Conducts General Survey of Agricultural, Climatic Resources
(RENMIN RIBAO, 19 Jan 80)............................... 93

Briefs

Rural Grain, Oil Rations 94
Zuoyu County Afforestation 94

SICHUAN

Monthly Cash Distribution Started in Sichuan Production Brigade
(RENMIN RIBAO, 7 Jan 80)................................ 95

CONTENTS (Continued) **Page**

Briefs

Forest Fire Circular 97
Wenjiang County Water Condition 97

XINJIANG

Briefs

Hoxue County Lambing 98
Shelterbelt Networks 98

ZHEJIANG

Briefs

Training Class 99
Castor Oil Production 99
Zhejiang Fishing 99
Lishui Prefecture Spring Afforestation 99

I. GENERAL INFORMATION

PROFESSOR XIONG YI STRESSES DEVELOPING AGRICULTURE

Beijing REMIN RIBAO in Chinese 21 Jan 80 p 4

[Article by: RENMIN RIBAO reporters Yu Quanyu [0827 5425 1008] and Cai Mingzhao [5591 0682 3564]]

[Text] Not long ago at an annual conference of the China Pedology Society in Chengdu, a reporter questioned the visiting Professor Xiong Yi (3574 3015): "China has a large population and very little land. How is agricultural modernization to be carried out?"

The professor answered: Among the pedologists of China the basic consensus is that attention must not be limited to the 1500 million mu of farmland from the viewpoint of small farm economy. The saying that "China has a large population and very little land" means very little farmland.

In terms of modernized, comprehensive, macro agriculture, the target should be the 9,600,00o km^2 of land.

China's pedological resources are very rich. There are many types. There is a long history of cultivation and there are large areas of meadows and forests. The slow development of agriculture in China in the previous years was not due to poor conditions. It was a matter of not having utilized these conditions reasonably. For example, terraced fields were constructed on steep slopes; paddies were built to a confusion of water systems. Forests were destroyed to cultivate the land without consideration of the soil characteristics to cause serious water and soil erosion. Meadows were plowed over with no consideration of the soil condition to produce desertification of soil. When the ecological environment was destroyed, frequent and serious natural calamities occurred. The result of these actions brought on basic damage to the farmland. Judging from the current condition of China, modernization of agriculture can be carried out only be resolving the problem of reasonable utilization of soil resources. The soil resources of the entire country should be clarified as quickly as possible. While attention is given to research on agricultural soils, studies on forest soils and grassland soils should be strengthened to produce overall reasonable planning. What is suitable for farming should be used for agriculture; what is suitable for forestation should be used for forestry; what is suitable for grazing should be used for animal husbandry so as to fully develop China's gigantic potential of soil resources. In this manner, we can cause afforestation of barren mountains, grains to be produced from poor lands, and cows and sheep contributed from meadows.

Question: The grain production of China is relatively low. What should be done to reverse this condition?

Answer: The fact that the grain production of China is not high simply serves to demonstrate the very great potential of production increase. Among China's fields, about one-third is producing below the average. Relatively speaking, the yield increase potential of low yield fields is greater than that of high yield fields. We should place emphasis on changing the large areas of low yield fields to high yield fields. This is a problem of strategic decision in agriculture. Sufficient attention must be given to it.

According to surveys, with a portion of the low yield fields, the cause is really "a disease" in the soil, but for a very large portion, the cause is only a deficiency of fertilizer. The soil is much too thin. At present, calculated on the basis of nutrition, China applies only 12 jin of chemical fertilizer per mu. According to the statistics of the grain organization of the United Nations, the average fertilizer application of Western European countries in 1976 was 24.5 jin, and it was 101 in Holland. In comparison, China's fertilizer application level is very low. It should also be pointed out that on the basis of not very high application of chemical fertilizer, there is also the unreasonable phenomenon in distribution and use. The high yield fields are excessively applied with chemical fertilizer to cause the economic efficiency of chemical fertilizer to be reduced. If the limited quantity of chemical fertilizer is applied primarily in the large areas of infertile soils, the economic efficiency will be much better than application in the small areas of high yield fields. With an increased application of chemical fertilizer and scientific cultivation, it is possible to have a yield increase of 200 jin per mu in the more than 500 million my of low yield fields. In this manner, the state may have an increase of more than 10 billion jin of grain per year. This will be very significant for the goal of producing 8 billion jin of grain by 1985.

In the process of reforming low yield fields, subjectivity of men should be fully utilized, but natural principles must not be opposed so as not to destroy the ecological balance. Some years ago, when the marsh land of Sanjiang in the northeast was being improved, drainage was considered but not irrigation. After the land was drained, drought occurred. In the North China plain, irrigation without drainage caused serious secondary salination. In the south, with water conservancy but without comparable drainage conditions, secondary gleization appeared in the paddy soils. These soils did not improve while some degenerated. The characteristics of soils vary and the environmental conditions are different while the "symptoms" of soils are not the same. If we administer drugs according to the symptom to adopt practical measures, it is very hopeful that the low yield may be changed into high yield within a not very long period of time.

Question: We understand that there are not a few places where for the purpose of increasing the yield, the replanting index was blindly increased. A reduction of soil fertility has been the result. How are we to avoid such a situation?

Answer: This is a worldwide problem. At a most recent international pedology conference, it was proposed that "aside from maintaining peace, there is nothing more important than protecting soils." The research of China's pedologists demonstrates that the improvement of China's cropping system must be based upon the principle of combining utilization with nurturing. "Wishing the horse to run and also wishing the horse not to eat grass" simply cannot be.

Cultivation, fertilizer application, irrigation, and drainage all have direct effect on the maintenance and increase of soil fertility. Advanced cropping system must be suitable for the land, while a combination of utilization and nurturing can cause the soil to be more fertile as it produces. This is the way to provide a reliable material basis for sustained high yield in agriculture. Historically, the Taihu region is mostly a one crop low rice paddies area. It was after the Song Dynasty, the system of cultivating the three wheat crops (barley, wheat, and naked barley) was gradually introduced to cause the low lands of the region to be used in a rotation of dry and paddy of dual crops of wheat and rice. In 1970, the system of dual crop of rice was tried in about 15 to 20 percent of the paddies and an obvious yield increase result was obtained. In the years following, the dual rice and wheat three-crop system was blindly extended to some areas of the region. Due to the fact that soaking time was prolonged, the condition of claypan occurred and the plowing layer became thinner while the plow sole increased in thickness. A layer of nonporous mud also appeared. The nutrient contents of the soil can no longer function. This problem is very extensive in the southern provinces. In Sichuan Province, a dual three-crop system has been proposed. There should be a rotation of three dry crops and a two-crop system. The dual three-crop system should be suitably limited in acreage and consideration should also be given to reasonable arrangement in space and reasonable rotation in time. In this manner, it may be made into a cropping system of combining utilization and nurturing, favorable for the maintenance and improvement of soil fertility.

6168
CSO: 4007

NATIONAL

MEASURES TO TAP ENERGY RESOURCES IN RURAL CHINA DISCUSSED

Beijing GUANGMING RIBAO in Chinese 25 Jan 80 p 4

[Article by Huang Zhijie [7806 1807 2638] and Xu Junzhang [5171 0193 4545] of the Joint Survey Group of the Chinese Academy of Sciences: "Problems in Rural Energy Resources"]

[Text] Rural China consumes approximately 38 percent of the nation's energy resources. Of this figure, nearly 86 percent is derived from biological energy resources and the remainder from other resources. An analysis indicates that homes in rural China consume nearly 90 percent of their energy resources and the balance goes to agricultural and sideline production. A survey of China's agricultural production shows that nearly 60 to 70 percent of the 400 to 500 million tons of stalks produced in the fields each year are burned as fuels by rural homes, with the remainder going to feed domestic animals and paper mills. Despite this many stalks, plus firewood, rural China still has a fuel shortage for 3 to 4 months a year.

As the modernization of agriculture is underway, we must attach importance to the endeavor to relieve rural China of energy shortages, including shortages of fuel oil for agricultural mechanization purposes and electric power and fuels for production and home use.

Unlike the developed industrial countries, our country's population is largely concentrated in rural areas, which consumed a large amount of our energy resources. If all rural homes were allowed to burn coal, they would cost our country 250 million tons of coal a year, a demand which could not possibly be met for a considerably long time to come. Nor is it likely for each rural household to burn coal now at an annual cost of 40 to 50 yuan, which accounts for the lion's share of its income. However, ways must be found to mobilize our available resources to solve energy shortages in rural China.

To this end, our primary task is to discard our oldfashioned methods of consuming biological energy resources. At present, they are used only once or twice. For a long time, our failure to effectively use biological energy resources as both fertilizer and energy has caused shortages of fuels, animal feed, and fertilizer, and it has hampered the development of agricultural production and prevented the people from achieving a higher standard of living. Like any other energy resources, biological energy resources can be reasonably used many times over. In the process of developing methane gas in rural China, at first the biological energy resources can be used as food and feed; by throwing night soil and dung along with green grass, leaves, and stalks into fermentation pits, we can produce a fuel called methane gas; after collecting methane gas into tanks, we can use the remaining water and sediment, which contain nitrogen, phosphorus, potassium and other rich plant nutrients, into the fermentation pits as organic fertilizer. By using biological energy resources this way, we can utilize all sources of energy and other substances inherent in living things to the best advantage. Only by utilizing biological energy resources in this way can we blaze a new trail in relieving rural China of energy shortages.

Beginning in 1975, rapid progress has been made in developing methane gas in rural China. So far, over 7 million methane gas fermentation pits capable of providing gas fuel for over 30 million people or 4.4 percent of households in rural China have been established and put into use. Many production teams using methane gas as fuel have described the process of converting biological energy resources into methane gas as the most economically effective measure to relieve rural China of fuel shortages.

A survey of rural China's resources indicates that by throwing all the night soil and dung and stalks that are now being burned as fuel into the fermentation pits, we can produce at least 136.5 billion cubic meters of methane gas a year. More methane gas can be produced by mixing them with green grass, leaves, and other biological energy resources now available in rural China. This huge reservoir of energy resources will be able to provide enough fuel for all rural China's homes, in addition to supplying 5 million methane gas power stations each capable of generating 5,000 to 8,000 kilowatts for 6 hours a day.

In developing methane gas in rural China, attention must be paid to the following two problems: 1. Highly effective and inexpensive methane gas lamps should be developed and widely used in an effort to conserve energy. 2. At present, all existing methane gas fermentation pits operating under normal temperatures cannot guarantee an uninterrupted supply of fuel to their users. To overcome this shortcoming, a temperature-control device must be invented to increase the output of methane gas to meet the needs of its users in all seasons. Only thus can we achieve success in consolidating and developing the methane gas business in rural China.

A rising demand for electricity can be expected as the modernization of agriculture is being realized and the people's living standards continue to rise in rural China. At present, even electric lights are not available in many parts of rural China. According to estimates, a production team with from 30 to 40 households needs at least 8,000 kilowatts of power. Multiplying this figure by the number of production teams in rural China, we would be required to supply an additional 50 million kilowatts nationwide. If this much electricity were transmitted by thermoelectric powerplants, they would have to burn 150 million tons of coal as fuel; this demand for electricity could not be met by the state-run power networks. This demand can be met by encouraging every production team to establish and put into operation a small methane gas power generating plant in cooperation with its own hog-raising farms. Its investment in this project is estimated at 500 yuan per 1,000 kilowatts. Once construction is underway, it will be able to produce results in only a few months. A generating capacity of 10 million to 20 million kilowatts can be produced if half of our rural production teams decide to run their own methane gas power generating stations, which are bound to play a significant role in relieving rural China of power shortages.

Water resources are plentiful in our country. Apart from the Yangtze and Yellow Rivers, communes and production brigades located along their tributaries can rely on their own resources to establish small-scale hydroelectric powerplants with a total capacity of nearly 60 million kilowatts, in cooperation with the irrigation projects. These powerplants can be expected to supply part of the needs of agricultural production units and homes in rural China. Rapid progress has been made by rural China in developing small-scale hydroelectric powerplants. So far, over 80,000 such plants, with the capability of generating over 3 million kilowatts for use by agricultural production units and homes, have gone into operation. But a survey of these small power projects has revealed a shortcoming in their operation. For example, they could not guarantee an uninterrupted supply of power when their small reservoirs were drying up in times of drought. Sometimes, they had to shut down during prolonged dry spells, thus adversely affecting production in some agriculturally predominant areas. This problem can be resolved only by applying scientific methods and by backing them up with thermoelectric powerplants.

In south China, low-grade coal has been discovered in rock formations. Small coal mines have also been developed and put into operation in various parts of our country, providing coal for plants run by communes, production brigades, and production teams. Some communes and production brigades in Zhejiang and Hunan Provinces have established limestone, tile and brick, cement and thermoelectric powerplants with low-grade coal as fuel, thus relieving rural communes of shortages of power and building materials.

Research into the use of solar energy has become a major concern of many countries in the world. But its wide and extensive use is still economically unfeasible and technologically impossible in our country. So far, some of the devices using solar energy are solar heaters, solar cookers, and other solar energy systems for seed cultivation, dehydration, and plant nurseries. Solar energy has also been concentrated to heat and cool the air and to generate power and electricity. Recently, some inexpensive solar furnaces and simple solar heaters have been produced to conserve energy in areas which receive many days of sunshine a year.

China has a long history of converting the energy of the wind into power. The force of the wind is a great natural source of energy, far surpassing that derived from mineral resources. For this reason, it is important to study the force of the wind so that it can be converted into energy. Favorable conditions for using the force of the wind as a source of energy exist in northeast China, Inner Mongolia, northwest China, Tibet, the southeast coast of China, its offshore islands, high mountains, and windy areas. The force of the wind can also be harnessed to pump water and to generate power in remote areas where electricity is not available. Nevertheless, the construction of a plant designed to convert the force of the wind into electric power remains too costly to be economically feasible.

Underground heat energy resources have been discovered in over 2,000 locations in our country--over 200 of them in Guangdong Province. Among these are underground hotwater resources and underground hot springs. But the idea of using them to generate electric power remains economically unfeasible because such a powerplant is really too expensive to build. Their economic value may rise if ways can be found to harness them for multipurpose use. In some parts of our country, they can be used to serve agriculture, to warm up the rice seedling fields, fish ponds, and vegetable nurseries. But ways must be found to control pollution and flooding.

In short, in relieving rural China of energy shortages, it is important to take into account the availability of resources, technology, and equipment, and the economic results. The key projects capable of providing fuel and power for agricultural production and homes must center on the multipurpose use of biological energy resources, the development of methane gas, the construction of small-scale hydroelectric powerplants in coordination with irrigation projects, and the multipurpose utilization of low-grade coal trapped in rock formations and the development of small coal mines. But whether solar energy, the force of the wind, and underground heat energy resources can be harnessed for practical uses depends on local conditions and economic results.

9574
CSO: 4007

'RENMIN RIBAO' COMMENTATOR ON MAKING USE OF NATURAL RESOURCES

HK130925 Beijing RENMIN RIBAO in Chinese 27 Feb 80 p 2 HK

[Article by commentator: "Make Full Use of Natural and Manpower Resources"]

[Text] How to press on in the wake of victory on the basis of last year's bumper harvest and score an all-round bumper harvest in agriculture this year is an important problem all localities must take into consideration when arranging production this year.

The primary condition for scoring an all-round bumper harvest in agriculture is to unremittingly implement the two documents of the Central Committee on agriculture and carry out the various policies. Apart from this, we must also properly grasp principal and sideline occupations. Properly grasping principal occupations means properly grasping grain crops in grain producing areas; economic crops in cotton, oil-bearing crop and sugar crop areas; and forestry, animal husbandry and fisheries in forestry, animal husbandry and fisheries areas. The proper grasping of principal occupations will provide a reliable guarantee for increasing agricultural production in a district. The proper grasping of sideline occupations will develop the diversified economy in a manner suited to local conditions, open avenues of production and make full use of the rich natural resources and abundant manpower resources so that all the people, land and things can be used to the best advantage. If both the principal and sideline occupations are properly grasped, grain crops and economic crops will develop simultaneously; farming, forestry, animal husbandry, sideline occupations and fisheries will flourish and develop in an all-round manner; and there will be more income for the state, the collective and the individual.

The basic condition in China's agricultural production is too many people, too little land and a poor foundation. How can we give play to this advantage of "many people" and transform the disadvantage of "little land and a poor foundation"? A realistic and practical method is to open all avenues and tap more financial resources. This method will not only carry out capital construction on farmland faster but will also improve the livelihood of the peasants more quickly on the basis of the development of production. This is at present an important link in scoring an all-round bumper harvest in agriculture and promoting the prosperity of the rural economy.

Agriculture is an organic entity, and farming, forestry, animal husbandry, sideline occupations and fisheries as well as other sectors must closely unite in coordinated development. Just take farming in agriculture. Apart from grain, cotton and oil-bearing crops, there also are jute, silk, tea, sugar, vegetable, tobacco, fruits and medicinal herbs. Therefore, the potential for developing a diversified economy is very great. Two-thirds of China is either mountainous or semi-mountainous, with plenty of wild plant resources in the hills. At present, only a few percent are being used. There are more than 1 billion mu of grassy hills and slopes in the south, but less than 300 million mu are being used. Only 20 percent of the substandard timber and less than 10 percent of the odds and ends, bark and wood shavings from forest areas are being used. The most important reason for this is that we did not in the past genuinely understand the interdependence and interpromotion of various occupations within agriculture and one-sidedly put the emphasis on grain to the neglect of other occupations and sectors. The second reason is that scientific research in these sectors has not been pushed forward in China, and the popularization of some of the fruits of scientific research already obtained have not been very successful. This has resulted in many useful and valuable materials being wasted. We must strengthen scientific research and popularize science and technology so that everyone will have the scientific knowledge of natural ecology as well as the natural conditions and natural resources of our country, strictly carry out work in accordance with natural law and make rational use of various resources. This is an important condition for developing all avenues of production.

The development of a diversified economy can create better conditions for employment. At present, many localities in the Chinese countryside are already feeling an oversupply of labor, and there will be an even greater labor surplus with the development of agricultural mechanization. As a result of mechanization, Gaixian County in Liaoning Province is using only a third of its labor in agriculture but sending the rest to the country's six hills and one river and developing a diversified economy so that there will be an all-round development in agriculture, industry and sideline occupations. This will turn the labor surplus into a labor shortage. Man is the most dynamic factor in productive forces. So long as avenues of production are opened and a diversified economy is developed, there will be no need to worry about outlets for labor. Following the development of agriculture, industry, sideline occupations and rural commerce, the internal readjustment of the agricultural structure, the construction of medium and small towns and the development of various professions and trades serving the livelihood needs of the people, more labor will be required. The increase in avenues of production will also provide more openings for employment.

To develop a diversified economy, we must make necessary readjustments and reforms in some of the unreasonable management and administration systems. Under the present administrative system, the producing, purchasing, processing, marketing and exporting of certain products are managed by several separate departments. This has resulted in conflicts of policies and dislocation of production and marketing. There are many concrete problems but no one to solve them. This condition must be gradually solved in implementing the eight character policy of "readjusting, restructuring, consolidating and improving." Products suitable for processing in the countryside should be processed as much as possible by commune- and production brigade-run enterprises. Pricing must be based on investigation and study and suitable adjustments must be made in the prices of some products with prices inclined to be on the low side. The practice of a handful of localities forcing down grades and prices must be resolutely corrected.

Since the third plenum of the 11th CCP Central Committee, the vast Chinese countryside has been filled everywhere with vitality, with the peasants in their millions fully confident of stepping up agricultural development. So long as we fully mobilize the masses of cadres and people, proceed from actual conditions, go all out, use every means to explore, make use of natural resources and manpower resources and advance on production in breadth and scope, a new situation of all-round development is bound to appear in our country's agriculture.

CSO: 4007

MIGRATION PATTERNS OF BROWN PLANTHOPPER STUDIED

Beijing KUNCHONG XUEBAO [ACTA ENTOMOLOGICA SINICA] in Chinese Vol 22, No 1, Feb 79 pp 1-19

[Article by Cheng Xianian [4453 6667 1628], Chen Ruochi [7115 5387 4654], Xi Xue [5045 1331], Yang Lianmin [2799 5114 3046], Zhu Zilong [2612 1311 7893], Wu Jincai** [0702 6651 2088], Qian Rengui** [6929 0117 6311], and Yang Jimsheng** [2799 6855 3932] of the Plant Life Protection Department of the Jiangsu Agricultural College: "A Study of the Patterns of Migration of the Nilaparvata Lugens*"]

[Text] Abstract: The nilaparvata lugens [brown planthopper] has already become an important insect destructive to our nation's production of paddy rice at present. Preliminary investigation shows the wintering regions of the nilaparvata lugens in our

---

*The authors wish to thank Professor Ma Shijun [7456 0023 7486] of the Chinese Academy of Sciences for his enthusiastic guidance and review of the draft of this article.

The authors also wish to thank the Guangxi Agricultural Science Academy, the Jiangxi Agricultural Science Academy, the Chenzhou Regional Agricultural Science Institute, the Insect Pest Observation Stations of the counties of Yongfu, Lean, Shexian, Huaian and Ganyu for their tremendous support and assistance, and over 100 xian insect pest observation stations at Dongyang, Dongzhi, Yichun, Tongcheng for providing data on the insects and growth of paddy rice.

Ding Jinhua [0002 6930 5478], Sun Jian [1327 0256], Wang Yinchang [3769 5593 7022], Yang Lianfang [2799 5571 5364], Cheng Ruolan [4453 5387 5695], Zhou Weijin [0719 1218 0689], Sun Jinxing [1327 6651 5281], Chang Jialin [1728 1367 2651], Hao Kangshan [6787 1660 7104], and Yin Xiangdong [3009 0686 2639], participated in part of the research work and received guidance and assistance from teachers Jiang Guangheng [3068 1684 1854] and Chang Xiaoxi [1728 1321 5032].

**Comrades Wu Jincai [0702 6651 2088] et al were students of the class of 1974. They have graduated and have been assigned to other work posts.

nation are distributed generally below the 12°C isotherm in January as the northern boundary. Since winter temperatures of each year are different, the northern boundary of the wintering regions shifts to between 21°N and 25°N latitudes. The presence of live paddy rice seedlings in the fields during winter is the biological indicator for the nilaparvata lugens to winter in that region. The distribution of wintering regions can be classified into: 1. Region of year-round propagation: The southern tip of Hainan Island south of 19°N latitude. 2. Region of wintering of a few: The region between the central part of Hainan Island and the Tropic of Cancer. 3. Regions impossible for wintering: In ordinary years, the nilaparvata lugens does not winter north of the Tropic of Cancer.

The study of many aspects in recent years concerning the source of insects in spring and summer each year in the vast paddy rice regions in which the nilaparvata lugens cannot winter in ordinary years proves that the insect has migrated from south to north over a long distance.

Our nation's eastern half is tentatively divided into six regions of occurrence according to the distribution of wintering nilaparvata lugens in our nation, the number of generations of the insect found in each of the paddy rice regions of the south and the north and the seasonal pattern of growth and decline of colonies of species: The region of year-round propagation, the region of wintering of a few, the Nanling region of six to seven generations, the Lingbei region of five generations, the Yanjiang region of four generations and the Yanjiang and Huai River region of two and three generations.

Studies of the past 3 years and especially observations of tracking the migrations in 1977 by stations established in each paddy rice region in our nation show that the insect migrates northward five times in spring and summer and migrates southward three times in autumn. The migratory routes of the nilaparvata lugens in the eastern half of our nation are generally as follows: The first "northward migration" occurs from the middle and last 10 days of April to the first 10 days of May, and begins from the region of year-round propagation south of the 19°N latitude to between

20° and 23°N latitudes in southern Guangdong and Guangxi provinces. The second "northward migration" occurs from the middle and last 10 days of May to the first 10 days of June, and begins from the central part of Hainan Island northward and from regions of the Indochina Peninsula on the same latitude to the southern part of Guangdong and Guangxi provinces and the Nanling region. The third "northward migration" occurs from the middle and last 10 days of June to the beginning of July and begins from the paddy rice regions in the southern parts of Guangdong and Guangxi provinces mainly to between the north of the Nanling region and the southern bank of the Changjiang. The fourth "northward migration" occurs in the first and middle 10 days of July and begins from the Nanling region mainly to the middle and lower reaches of the Changjiang and spilling over into the Huai River valley. The fifth "northward migration" occurs between the last 10 days in July and the beginning of August and begins from the Lingbei region and southern parts of the Yanjiang region to the region between the Changjiang and the Huai River and the paddy rice regions north of the Huai River. Between the last 10 days of August and the beginning of September, intermediate rice matures in regions along the Huai River and regions north of the Huai River. The insect begins to migrate to the south at this time. The middle 10 days of September is the peak of migratory return from the regions between the Changjiang and the Huai River to the regions of the Changjiang. Between the last 10 days of September and the first 10 days of October, the insect returns from the middle and lower reaches of the Changjiang to the regions north of the Nanling region. From the middle 10 days of October and November, the insect returns from the regions south of the Changjiang and the Lingbei region to southern China and regions further south. Based on the above studies, the regions of occurrence of the nilaparvata lugens in our nation's eastern half and routes of migration have been mapped.

Foreward

In the past 10 years, there has been a visible increase in the frequency of large occurrences of the Nilaparvata lugens Stål in our nation and some Asian nations. The pattern of occurrences and especially the study of the insect's migratory and wintering characteristics have attracted widespread attention. Some research units in over 10 provinces and regions in the

Changjiang River Valley and south such as Guangxi, Guangdong, Jiangsu, Zhejiang, Anhui, Fujian, Hubei and Sichuan provinces have conducted continuously for many years large scale investigations (3,4,6,7,8) of the wintering of nilaparvata lugens. Results of many years of investigation by these regions show that only a few adult insects, nymphs or eggs can live through winter normally on regenerative rice and seedlings of premature grains in a few warm winter and spring regions in southern Guangdong and Guangxi and in the Longxi area of Fujian. In the past, there had been reports of eggs of nilaparvata lugens wintering on foxtail (setaria viridis) (1), and inside the stems of graminaceous weeds such as the setaria viridis, paspalum distichum and leptochloa chinensis. Studies of some years ago by the Zhejiang Academy of Agricultural Sciences and the Guangxi Academy of Agricultural Sciences consistently showed that the nilaparvata lugens cannot exist and lay eggs for wintering on setaria viridis. That which lives and reproduces on the setaria viridis year-round and lays eggs for wintering is the nilaparvata bakeri (Muir) and the nilaparvata muiri (China) (3,4,6). These studies also included feeding observations and tests of feeding habits. It was discovered that the nilaparvata lugens shows obvious monophagy toward paddy rice. When it is grown on such weeds as the setaria viridis and the leptochloa chinensis, it cannot develop completely. Even when the recently born nymph is placed on such weeds as the setaria viridis, it will only live for 2 to 10 days and die one after the other. Many investigations were made on these graminaceous weeds mentioned above after winter but no wintering eggs and nymphs born from live nilaparvata lugens were found (4,5,6). Studies of the characteristics of wintering eggs of the nilaparvata lugens by the Yongshun County Agricultural Bureau of Hunan Province showed that the large number of eggs laid by the nilaparvata lugens on the many kinds of weeds near rice plants in that locality away from the wind and where temperatures do not fluctuate much and the temperatures and humidity are relatively high at the end of autumn are not wintering eggs characterized by dormancy or stagnation of growth. This type of eggs cannot winter under natural conditions of the locality. Analysis of the mesurements of the tolerance to cold of each stage of the nilaparvata lugens conducted by the Agricultural Science Institute of Hubei Province combined with the data of winter temperatures over the years at the locality also proved that neither the egg nor the adult nilaparvata lugens insect can winter under natural conditions of the locality. In summary, the above shows the nilaparvata lugens has an obvious monophagy toward paddy rice, likes warmth, has a weak tolerance to cold, and does not truly possess characteristics of dormancy and wintering. Therefore, it is difficult for the nilaparvata lugens to exist or live continuously in the broad paddy rice regions of our nation's central and northern regions during the winter season when there are no live paddy rice seedlings in the fields. The insect source that occurs in spring and summer the next year, by inference, could only have migrated from the place of occurrence at the end of the year in the tropical zone. Asahina and Tsuruoka et al observed large swarms of nilaparvata flying over the sea (11) at the Pacific Ocean Meterological

Observatory (called the "south point") 500 kilometers southwest of Honshu of Japan in July, 1967. Later, Japan's Kishimoto Ryoichi et al made over 10 other observations at the "south point" and at sea in our nation's East Sea. Many facts were gathered which sufficiently proved that the nilaparvata can migrate over long distances of over several hundred kilometers (9, 10, 10, 12, 13, 16, 19). But due to the limitations of Japan's geographical environment, the truth about the migratory flight of the nilaparvata could not be clarified. We began in 1976 to study the migratory flight patterns of nilaparvata lugens over regions of our nation's eastern half with the support of the Chinese Agricultural and Forestry Science Academy and the help of over 100 insect pest observation stations throughout the nation and concerned research units. The superiority of our nation's geographical vastness and of great socialist cooperation was fully utilized in an attempt to clarify the routes of migratory flight of the nilaparvata over our nation's eastern half and over the entire East Asian region, and to provide a basis for medium and long range forecasts and to search for a way to eradicate the problem.

The Method of Study

The study of the characteristics of migratory flight of the nilaparvata lugens included observation and investigation of wintering in the south, observation and analysis of information on "simultaneous and sudden occurrences," investigation of the relationship between the peak period of occurrence of long winged adult insects in each paddy rice region and the planting system and growth period of paddy rice, study of the relationship between migratory flight and the development of the ovary of the female nilaparvata lugens, and analysis of the meteorological conditions of the entire route of migratory flight.

The study of the paths of migratory flight of the nilaparvata lugens involved observation by tracking the migratory flight from fixed points on the ground at equal distances.

Observation stations were set up based on the 1976 report entitled "Zoning the Regions of Occurrence of the Nilaparvata Lugens in the Eastern Half of Our Nation and Hypothesis of its Migratory Flight Path." Observation stations were set up in the region between Nanning in Guangxi (22°49' N latitude) and Huaian in Jiangsu (33°40' N latitude) every one to two degrees latitude apart to observe and track migrations of the nilaparvata lugens into and out of each region of occurrence, and to study the connective relationship of migratory flight among different regions. The positions of each point of observation were:

Guangxi	Nanning Guangxi Regional Agricultural Science Academy, N22°49' E108°21'
Guangxi	Yongfu Xian Insect Pest Observation Station N25°00' E110°00'

Hunan	Chenzhou Regional Agricultural Science Institute, N25°48' E113°02'
Jiangxi	Lean Xian Insect Pest Observation Station N27°24' E115°48'
Jiangxi	Jiangxi Provincial Academy of Agricultural Sciences at Nanchang N28°40' E115°56'
Anhui	Shexian Insect Pest Observation Station, N30°08' E118°13'
Jiangsu	Our College's Insect Pest Observation Station at Yangzhou, N32°28' E119°30'
Jiangsu	Huaian Xian Insect Pest Observation Station, N33°40' E119°08'

In 1977, a unified method was used at each of the above points to investigate the growth and decline of the nilaparvata lugens. The observations were compared with data on the "sudden and simultaneous increase and sudden and simultaneous decrease" of insects in a large area to study the migratory flight pattern. At the same time, migratory flight activities were studied and analyzed from data on the planting systems, the growth periods of paddy rice, the growth and development of nilaparvata lugens, and weather data at each locality. Experimental forecasts of the time of migration into a region and the time of migration out of a region and the degree of damage were made.

Ground weather data were separately provided by the meteorological observatory and stations at each locality. Atmosphere meteorological data were provided by the Nanjing meteorological observatory.

The physiological mechanism of migratory flight of the nilaparvata lugens was preliminarily studied in the laboratory.

Results of Study and Analysis

(1) Investigation of the Wintering of Nilaparvata Lugens in Southern China

In February and March of 1977 and during the same period in 1978, we went to places in southern Guangdong, Guangxi and Fujian provinces and investigated the wintering of the nilaparvata lugens. The results of the investigation and unrelated materials of the past have been prepared and listed in Table 1.

It can be seen from Table 1 that the wintering region of nilaparvata lugens in our nation is bounded by the isotherm of 12°C in January or the region where the lowest winter temperature is between 2°C and 3°C. In ordinary years, the 12°C isotherm in January coincides with the Tropic

1)表1 褐飞虱越冬界限与各地各年冬季温度关系

2)地点	6)广东琼海		7)广东海口		8)广东海康		9)广西玉林		10)广西南宁		11)广东汕头		12)福建漳州		13)广西永福	
3)地理位置	N 19°14′		20°02′		20°55′		22°40′		22°49′		23°41′		24°30′		25°00′	
	E110°28′		110°21′		110°05′		110°08′		108°21′		116°37′		117°39′		110°00′	
4)温度与越冬 5)年份	14)温度℃	15)越冬	温度℃	越冬	温度℃	越冬	温度℃	越冬	温度℃	越冬	温度℃	越冬	温度℃	越冬	温度℃	越冬
(6) 1.一月份平均温度																
1975	18.4	+	17.2	+	15.9	+	13.5	+	13.5	+	14.1	+	13.1	+	9.4	±
1978	18.7	+	18.0	+	16.0	+	13.5	+	13.4	+	13.2	+	12.5	+	9.2	−
1974	18.3	+	16.9	+	15.6	+	12.1	−	11.2	−	11.0	−	12.4	±	6.2	−
1976*	16.1	+	15.6	+	13.6	+	12.1	−	11.3	−	12.3	−	11.9	−	8.3	−
1977	16.3	+	15.4	+	12.6	±	8.8	−	8.3	−	11.0	−	12.1	−	3.9	−
17) 2.一月份平均最低温度																
1975	16.2	+	15.8	+	13.8	+	10.7	+	11.3	+	12.0	+	10.8	+	7.3	±
1978	15.6	+	15.3	+	13.5	+	10.3	+	10.4	+	9.9	+	8.4	+	6.4	−
1974	14.6	+	13.6	+	11.2	+	8.0	−	7.5	−	9.8	−	8.7	±	3.2	−
1976	13.0	+	13.3	+	10.7	+	8.0	−	7.0	−	8.9	−	6.3	−	4.3	−
1977	13.5	+	12.9	+	10.7	±	6.7	−	6.1	−	8.5	−	7.1	−	1.8	−
18) 3.各年冬季极端低温(12—2月)																
1975	12.3	+	11.2	+	9.5	+	5.6	+	6.4	+	6.0	+	4.3	+	1.0	±
1978	9.8	+	9.4	+	6.4	+	2.8	+	3.0	+	5.0	+	1.9	+	−1.2	−
1974	5.6	+	4.9	+	5.1	+	1.6	−	0.7	−	1.5	−	1.3	±	−2.1	−
1976	5.3	+	5.3	+	8.1	+	1.0	−	0.3	−	−1.4	−	−1.4	−	−2.5	−
1977	8.4	+	7.3	+	3.9	±	1.1	−	0.3	−	1.3	−	1.3	−	−3.0	−
19) 4 各年冬季地面0厘米极端低温																
1975	12.6	+	10.2	+	8.9	+	4.9	+	3.6	+	5.4	+	—	+	−0.9	±
1978	9.4	+	9.0	+	4.4	+	1.4	+	1.4	+	3.0	+	−0.5	+	−2.7	−
1974	4.6	+	3.0	+	1.8	+	−0.7	−	−4.5	−	−0.9	−	—	±	−6.4	−
1976	5.4	+	3.8	+	1.3	+	0.0	−	−3.6	−	−0.2	−	−3.5	−	−7.5	−
1977	6.9	+	5.5	+	3.4	±	0.7	−	−0.5	−	0.7	−	−0.5	−	−8.7	−
20)越冬区划	21)常年少量越冬区						22)间歇少量越冬区									

23)注：1) 表中年份系按冬季（12—2月）温度高低为顺序排列，以便找出越冬温度界限。

2) 越冬调查结果(+)号表示查到虫，(−)号表示未查到虫，(±)号表示偶尔查到极个别的卵块或若虫。

3) *为12月份资料，因该年12月份平均温度最低。

4) 1976年冬至1978年各越冬调查工作由作者们进行；1976年以前系参照各地历年调查资料。

Key:

1) Table 1. Relationship Between the Boundaries of Wintering Regions of the Nilaparvata Lugens and the Winter Temperatures at Each Location and in Each Year
2) Location
3) Geographic position
4) Temperature and wintering
5) Years
6) Guangdong Qionghai
7) Guangdong Haikou
8) Guangdong Haikang
9) Guangxi Yulin
10) Guangxi Nanning
11) Guangdong Shantou
12) Fujian Zhangzhou
13) Guangxi Yongfu
14) Temperature °C
15) Wintering
16) 1. Average temperature in January
17) 2. Average lowest temperature in January
18) 3. Extreme low temperatures in winter of each yea. (December - February)
19) 4. Extreme low temperatures at 0 centimeters above ground in winter of each year
20) Wintering region
21) Region of wintering of a few in ordinary years
22) Region of intermittent wintering of a few
23) Remark: 1) The years in the table are arranged according to temperatures during the winter months (December - February) in a descending order to facilitate finding of a boundary temperature.

2) Results of investigation of wintering insects:
(+) indicates insects were found,
(-) indicates insects were not found,
(±) indicates occasionally finding insects and finding eggs or nymphs.

3) * indicates data of December, since the average temperature of December of that year was the lowest.

4) Investigation of wintering insects was conducted by the authors from winter of 1976 to spring of 1978. Prior to 1976, investigative data for each year at each locality were used.

of Cancer. Therefore, the northern boundary of the wintering region generally follows the Tropic of Cancer (23°26'N latitude). Since winter temperatures vary greatly between one year and the next, the actual northern boundary of the wintering region each year shifts between 21° and 25° N latitudes as temperatures vary. Besides temperature, the presence of paddy rice seedlings in the fields in winter is the biological indicator of whether the insect can or cannot winter at that locality. For example, the winter temperatures of 1976 were the lowest in recent years. In February and March of 1977, a large number of adults and nymphs of advanced age were found in the paddy rice fields in Lingshui County (south of 19°N latitude) on Hainan Island. The number of insects found in the paddy rice fields of Lianghai County was smaller. Only a few young nymphs and eggs were found on the seedlings of autogenic paddy rice and regenerative paddy rice in the green manure fields in suburban Haikou City. None was found in regions north of here. That year, the northern boundary for wintering was south of 21°N latitude. In 1977, winter temperatures were the highest in recent years. In February and March of 1978, a few living adults or nymphs were found at Yulin (22°40'N latitude) in Guangxi, Nanning (22°49'N latitude) in Guangxi, Shantou (23°41'N latitude) in Guangdong and Zhangzhou (24°31'N latitude) in Fujian. That year's wintering boundary obviously shifted north approaching 25°N latitude. In ordinary years north of 25°N latitude, regenerative rice exists normally only under special microenvironmental conditions, such as places near hot springs where water wells up, and individual wintering nilaparvata lugens can be discovered. It is preliminarily believed that the areas where the nilaparvata lugens winters in our nation can be divided into three regions:

(1) The region of year-round propagation: The region south of the dividing ridge of Wuzhi Mountain south of Hainan Island;

(2) Region where wintering is impossible: Region north of the Tropic of Cancer;

(3) Region of wintering of a few: The region between the two above bounded by 21°N latitude at the central part of Leizhou Peninsula. This region is further divided into two subregions. One is a region of wintering of a few in ordinary years and the other is a region of wintering of a few in intermittent years.

(2) The Relationship Between the Growth Period of Paddy Rice and the Period of Peak Occurrence of Long-Winged Adult Insects and the Period of Migrating Outward

Our nation is vast. Temperatures gradually decrease step by step from south to north. The time suitable for growth of paddy rice also shortens accordingly. Thus different types of regions of cultivation of paddy rice and corresponding systems of cultivation are formed. The times of transplanting, yellow ripening and harvesting of early rice in each of the paddy

Table 2. Yellow Ripe and Maturation Periods of Early Rice in Our Nation's Southern Regions and the Period of Peak Occurrence and Outward Migration of Long-Winged Nilaparvata Lugens

Region of Occurrence	Location Providing Data	Geographical Position (N latitude)	Yellow Ripe and Harvesting Periods of Early Rice: Early Maturing Variety	Yellow Ripe and Harvesting Periods of Early Rice: Intermediate, Late Varieties	Period of Peak Occurrence of Long-Winged Adult Insects of Nilaparvata Lugens
(2) Region of wintering of a few (southern parts of Guangdong and Guangxi)	Guangdong: Haikang, Huiyang, Shantou, Huaxin, Conghua Guangxi: Dongxing, Yining, Nanning, Guixian	20°55'-23°31'	First 10 days of June	Last 10 days of June	Second and last 10 days of June
(3) Nanning region	Guangdong: Qujiang Guangxi: Liuzhou, Heci, Yongfu, Lingzhou, Ziyuan Jiangxi: Longnan, Ganzhou Southern Hunan: Guiyang, Chenzhou Fujian: Changtai, Jinjiang, Shanghang, Yongchun, Datian, Fiqing, Changding, Yongan	24°20'-26°05'	First 10 days of July	Second and last 10 days of July	First to second and last 10 days of July
(4) Linbei region	Southern Hunan: Laiyang, Lingling, Wugang Jiangxi: Fuzhou, Jian, Lean, Yichun Zhejiang: Weizhou Fujian: Xhaxian, Jianning, Jianyang, Zhouning Fuding Guizhou: Tianzhu	26°16'-28°01'	Second 10 days of July	Second and last 10 days of July	Second and last 10 days of July

[table 2 continued]

Table 2. [continuation]

Region of Occurrence	Location Providing Data	Geographical Position (N latitude)	Yellow Ripe and Harvesting Periods of Early Rice		Period of Peak Occurrence of Long-Winged Adult Insects of Nilaparvata Lugens
			Early Maturing Variety	Intermediate, Late Varieties	
Yanjiang region	Hunan: Yuanjiang, Huyuan Jiangxi: Nanchang Zhejiang: Quxian, Huangyan, Linan Anhui: Dongzhi, Shexian, Ningguo, Zongyang, Taihu, Panchang Hubei: Xinzhou, Laifeng, Puqi, Jianli, Yidu, Daye Sichuan: Fuling	28°-31°	Last 10 days of July	End of July to beginning of August	Last 10 days of July to beginning of August
Yangjiang region (northern part)	Anhui: Panchang, Wuwei, Shucheng, Chaoxian, Tongcheng Jiangsu: Wuxian, Wuxi, Jiangyin, Gaochun Shanghai: Fengxian, Huacao Zhejiang: Jiashan, Linan	About 31°-32°	End of July	First 10 days of August	First 10 days of August

rice regions of the south and the north basically become later and later from south to north. This provides a rich source of food for the migratory nilaparvata lugens insect which has a monophagy toward paddy rice. But the nilaparvata lugens insects that feed on different stages of paddy rice grow into different colonies of species characterized by different types of wings. In general, nilaparvata lugens insects that live between the tillering stage and the panicle bearing stage of paddy rice mainly become short-winged adults. Those that live during the latter growth periods of paddy rice mainly become long-winged adults (2, 17, 18).

Between 1977 and 1978 we separately investigated the peak periods of occurrence of long-winged adults of nilaparvata lugens and data on the planting systems and growth periods of paddy rice in over 70 counties and cities. The information is listed in Table 2. Comparing the periods of occurrence of the nilaparvata lugens at different localities clearly shows that after the peak occurrence of long-winged adults at the time of maturation of paddy rice in the southern paddy rice regions, the number of long-winged adults emerging in the fields or under field lamps in another paddy rice field in the north increases suddenly. We believe this is a phenomenon of connection between the migration from a region in the south and migration into a region in the north. Therefore, the yellow ripe stage of paddy rice and the time of peak occurrence of long-winged adults at a particular locality can be taken as that locality's indicators of the time of an outward migration.

(3) The Relationship Between Migratory Flight and the Development of the Ovary of the Long-Winged Female Adults of the Nilaparvata Lugens

Since nilaparvata lugens insects fly in a shingled (overlapping) fashion, many peaks of migrating out of and migrating into a certain region occur, thus the "phenomena of sudden increase and sudden occurrence" cannot be the only basis for judging the properties of the source of insects. In 1977 we systematically dissected the ovary of the long-winged female adult nilaparvata lugens that migrated out of and into each observed region. The development of the ovary was observed in five standard stages (Figure 1). The results show at the time of outward migration from each region (including migratory returns), the stages of development of the ovary of the long-winged female adult captured in the field or under field lamps were mainly the first or second stage, i.e., none had mated, as shown in Figure 1 by the percentages of the stages of development of the ovary at the time of outward migration from each locality below the horizontal lines. The percentage of the ovaries in long-winged female adults in the field at the first stage of development was large. The percentage of ovaries at the first stage of development in insects captured under the field lamps was lower than the percentage in those insects captured in the field. We believe this is due to the continuous outward migration of nilaparvata lugens after eclosion. Only adult insects that have just recently emerged from eclosion have a greater chance of being captured. The stage of development

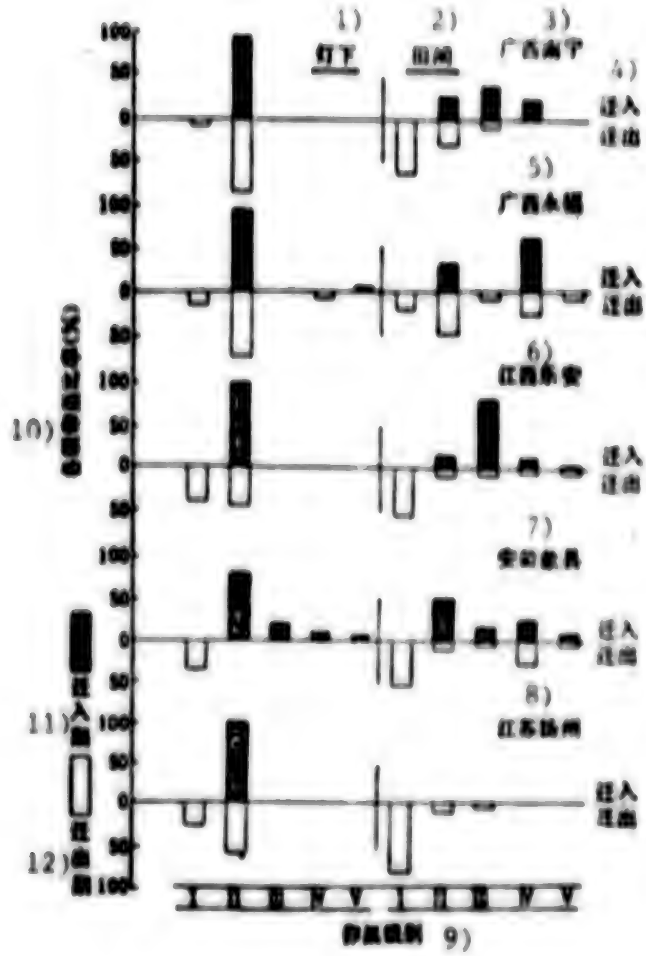


Figure 1. Relationship between migration and the development of the ovary of the long-winged female adult of nilaparvata lugens (1977)

Key:
1) Under the lamp
2) In the field
3) Guangxi Nanning
4) Migrating in, Migrating Out
5) Guangxi Yongfu
6) Jiangxi Lean
7) Anhui Shexian
8) Jiangsu Yangzhou
9) Classification of the stages of development of the ovary
10) Percentage of ovaries of different stages of development (%)
11) Period of inward migration
12) Period of outward migration

of the ovary of the long-winged female adult captured under field lamps at the time of migration into each region was mainly the second stage. The percentage of those mated was low. This is because the insects were attracted toward the lamps as soon as they arrived and the ovary had not continued to grow (indicated by the portion above the horizontal line at the left under each region in Figure 1). For example, at the time of migrating into the three regions of Nanning, Lean and Yangzhou, all of the ovaries were at the second stage of development. At Yongfu, ovaries at the second stage of development constituted 98.3 percent, and those at the third stage of development constituted only 1.7 percent. Ovaries at the first stage of development were not found. The percentage of mated insects was 0 to 1.7 percent. The stages of development of the ovaries in long-winged female insects captured in the field were all beyond the second stage. The percentage of mated insects was high. This might have been because the insects ate when they migrated into the fields and the ovaries continued to develop (as indicated by the portion above the horizontal line at the right under each region in Figure 1). In the nets set up on the high mountain peaks of Huangshan at an elevation of 1,840 meters above sea level, female insects captured when they migrated into the region carried ovaries mostly at the second stage of development, or 99.1 percent, and the insects had not mated.

The above facts show that when migratory insects begin their flight or are in flight, the ovaries of the female have not yet developed to maturity or have only developed to the latter period of the "young period of eclosion" before mating, i.e., between the time after eclosion of the adult insect and the time the insect possesses the full capability to fly. Johnson and Kishimoto Ryoichi both reported similar observations (14, 15, 20). We believe dissecting the ovaries of the long-winged adults in the field to determine the stages of development of the ovaries can be a method of studying the path of migratory flight. In 1977, long-winged female adults in the field were dissected simultaneously at many observation points to observe the stage of development of the ovary and to determine whether the migratory flight is out of or into a region or the migratory path.

(4) Relationship Between the Growth and Decline of the Number of Insects in the Fields and Under Field Lamps of the Region Left and the Region Entered

The long-winged adult nilaparvata lugens that undergoes eclosion at the time of yellow ripening of paddy rice possesses the ability to migrate away from the insect source. At this time, a forecasted peak occurrence of insects under the field lamp is generally regarded as a peak of outward migration. But observations made at each station in 1977 indicate that during the time of outward migration of the nilaparvata lugens, the insects generally are not attracted to light. The insects climb to the upper parts of the paddy rice plants at dawn or dusk and fly straight towards the sky. If a peak occurs under the field lamp at this time at the locality of outward migration, these insects actually do not have the ability to migrate. The true peak of outward migration occurs only when the number of insects under the lamp "is suddenly reduced" at the locality, and the number of insects migrating into the neighboring region "suddenly increases," manifesting an obvious phenomenon of connection.

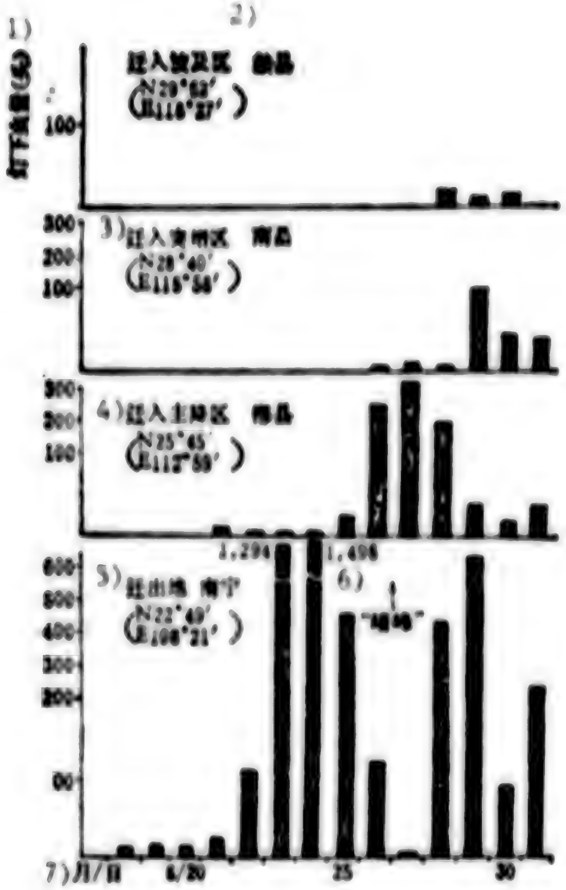


Figure 2. Relationship between the region of outward migration of the nilaparvata lugens and forecasts of the growth and decline of the number of insects under lamp at the region of inward migration

Key:
1) Number of insects under lamp (insect)
2) Migrating into spillover region Shexian
3) Migrating into regions of sudden increases Nanchang
4) Migrating into region of major descent Chenxian
5) Region of outward migration Nanning
6) Dark peak
7) Month/day

To explain this migratory flight process of "decreasing here and increasing there," we correlated the "sudden decrease" in the number of insects under the field lamp at the locality the insects left designated as the "dark peak" of outward migration and the "sudden increase" in the number of insects under the field lamp at the locality the insects migrated into designated as the peak of inward migration ("bright peak") (Figure 2).

Whether the swarm of insects at the region to be left can immediately migrate outward, i.e., the condition for the occurrence of a "dark peak," is closely related to the weather conditions of the locality at the time. For example, during the period of peak occurrence of long-winged adults in Nanning in Guangxi Province during the middle and last 10 days of June, 1977, systematic dissection of the ovaries of female insects showed the ovaries were all at the first or second stage of development. On June 23 and 24, a high peak of over a thousand insects occurred each day under the field lamp. Between June 25 and June 27, the number of insects under the field lamp "suddenly decreased." On the 27th, only a few insects were attracted and captured. On June 28, the number of insects under the field lamp increased again. On June 23 and 24, "sudden increases" under field lamps at localities north or northeast of Nanning at Chenzhou in Hunan, Nanchang in Jiangxi and Shexian in Anhui were not discovered. But between June 25 and June 27 when a "dark peak" occurred in Nanning, a peak inward migration occurred at the above localities. In particular, the peak of inward migration at Chenzhou in Hunan which is closer to Nanning in Guangxi coincided obviously with the "dark peak" of outward migration at Nanning in Guangxi.

The reason for the formation of the above phenomenon can be understood from the analysis of weather conditions at the localities of the time. Before June 25, a ground stationary front lingered near Nanning. The insects at that locality could not fly away and migrate outward so they flew toward the luring lamps. At the time, those that flew toward the lamps also included insects from regions south of Nanning which were in transit in the course of their migratory flight and which were forced to land by the lower air current of the weather front. Between June 25 and 27, a subtropical pressure system pushed north and the stationary front passed over Nanning and moved north. The insects followed the air current and moved out, causing a "sudden decrease" in the number of insects under the field lamps. On June 26, the stationary front passed Chenzhou and reached Nanchang. It passed Shexian on June 27, and therefore "sudden increases" or peaks of inward migration occurred one after the other at each of these localities. After June 29, at a high altitude of 500 millibars and 120°E longitude, the subtropical high pressure ridge line crossed 23°N latitude. Nanning is located to the south of the subridge line of high pressure where weather conditions for outward migration were not present. Therefore the number of insects under the field lamp increased again. This phenomenon was uniformly reflected in the observations made at all observation stations in 1977. In the first and middle 10 days of September of the same year, when the nilaparvata lugens migrated back toward the south from the Changjiang and Huai River regions to Yanjiang and the southern regions of the Changjiang, a connection was discovered between the growth and decline of the number of insects under the field lamp forecasted at Yangzhou and the number of insects captured by the high mountain nets on top of Huangshan in Shexian, Anhui, and the number of insects captured by the low mountain nets at Dongzhixian. When a "dark peak" occurred under the field lamps between September 8 and September 12 at Yangzhou, the region left by the insects, more insects were captured by the nets at the regions entered by the

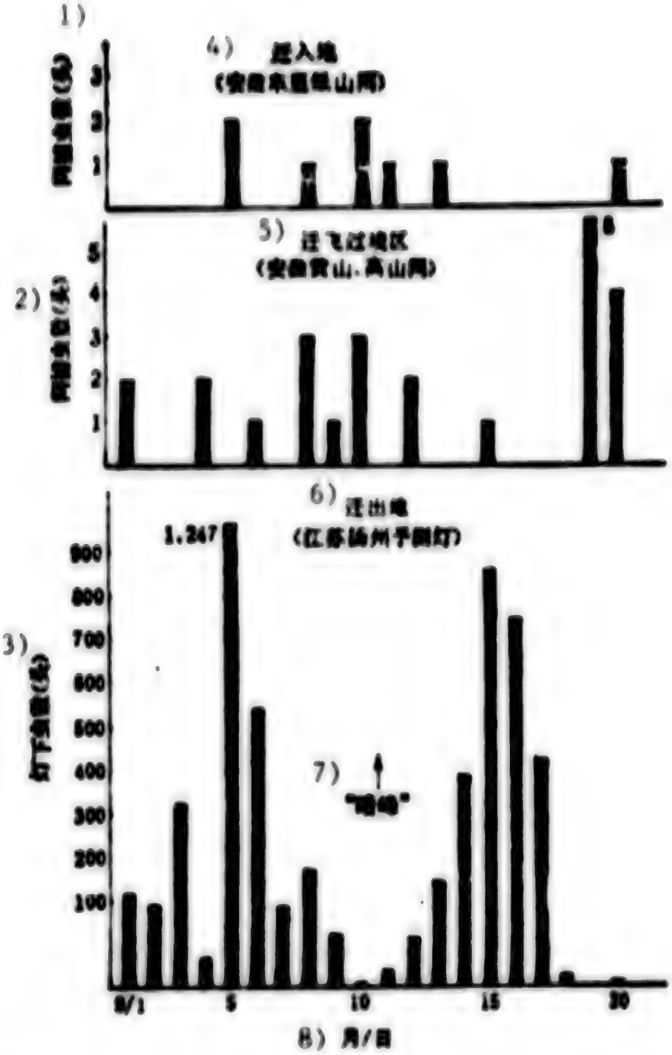


Figure 3. Relationship between outward migration in autumn by the nilaparvata lugens as they return and the number of insects captured by luring lamps and nets at locations of inward migration

Key:
1) Number of insects captured in nets (insect)
2) Number of insects captured in nets (insect)
3) Number of insects captured by lamps (insect)
4) Region migrated into (low mountain net at Dongzhi in Anhui)
5) Region of migratory transit (high mountain net at Huangshan in Anhui)
6) Region of outward migration (forecasting lamp at Yangzhou in Jiangsu)
7) "Dark peak"
8) Month/day

insects or transit regions at Huangshan and Dongzhixian. While a "bright peak" occurred under the lamps at Yangzhou when the insects were unable to migrate outward, the number of insects captured by the nets at Huangshan and Dongzhi reduced (Figure 3).

During a northward migratory flight in spring and summer, whenever a "dark peak" of outward migration described above occurs, subtropical high pressure ridge lines on the weather map at 500 millibars are all located 3 to 4 latitudes south of the observation point. When the subtropical high pressure ridge line reaches the locality of outward migration, the insects will be unable to fly out. The places to be migrated into generally are south of the trough lines or shear zones. In autumn at the time of return migration, the reverse happens. The insects are often forced to land north of the trough lines, shear zones or fronts in cold regions. It seems that one migration generally occurs within the zone from north of the subtropic high pressure ridge line to within 6 to 8 latitudes near the trough line. It is estimated that the distance between the place of outward migration and the major region of descent is about 300 to 600 kilometers. The f_7 peak of insects that occurred between June 26 and July 4, 1977, coincided with this situation.

(5) Analysis of the Phenomenon of "Simultaneous and Sudden Increases" in Large Regions

1. The phenomenon of "simultaneous and sudden increases" in the early period of inward migration

For several years during the course of our survey and of the nilaparvata lugens at Yangzhou, we discovered that the emergence of long-winged adult nilaparvata lugens every summer was always a "sudden increase." For example, starting from the first 10 days of June, 1976, we systematically investigated the presence of the insect in a fixed field by 3 capturing methods using nets, dish-shaped swatters and yellow disks to lure the insects every day or every other day. We also set up two-colored insect luring lamps and ordinary insect luring lamps for forecasting the occurrence of the nilaparvata lugens. For over one month up to July 14, none of the five methods detected any insects. But on July 15 and 16, the five methods of detecting insects almost simultaneously discovered the nilaparvata lugens. The number of insects was small. Each method only detected one to two insects but they all discovered the insects suddenly and simultaneously. "Sudden and simultaneous increases" in the fields or under insect forecasting lamps at the insect observation stations at the counties of Dongvang and Xiaoshan in Zhejiang, Wujiang, Yixing, Wuxi, Taicang, Wujin, Yangzhong, and Huaian in Jiangsu, Dongzhi, Chaoxian, Tongcheng and Shucheng in Anhui, and Chuansha in Shanghai were reported. About August 12, another typical "simultaneous and sudden increase" (Figure 4) occurred in Jiangsu, Zhejiang, Anhui and Shanghai. Between June 26 and July 4, 1977, a "simultaneous and sudden occurrence zone"

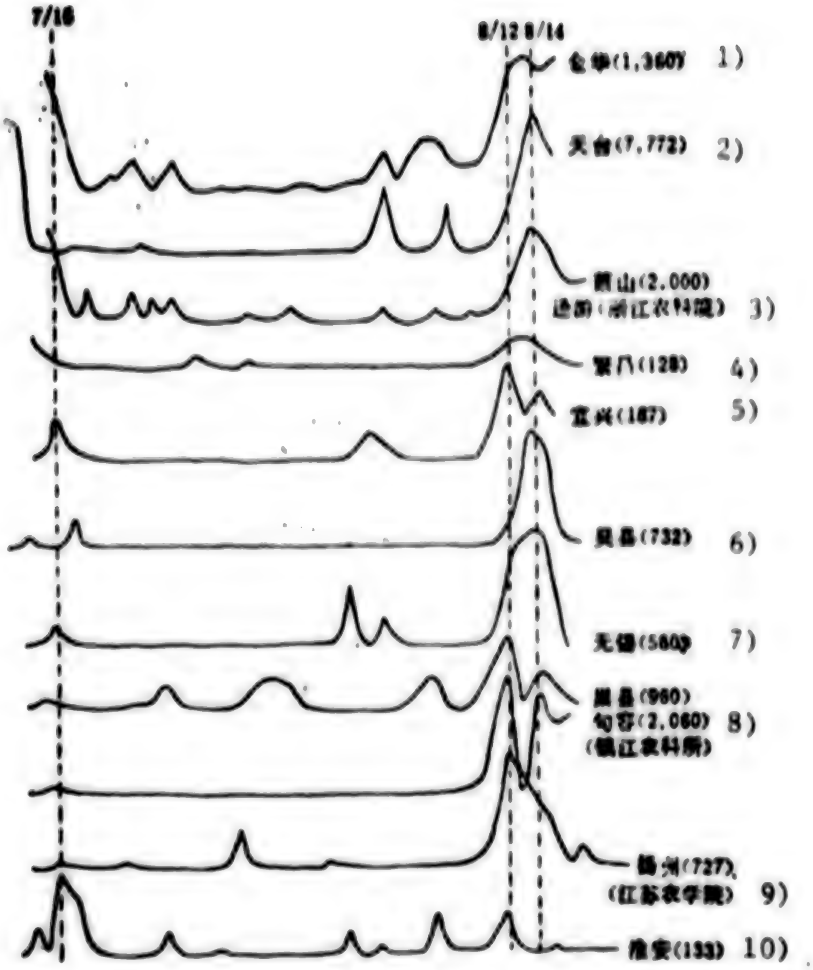


Figure 4. Diagram of "simultaneous and sudden occurrences" of the nilaparvata lugens in regions of the lower reaches of the Changjiang in 1976

Key:

1)	Jinhua	7)	Wuxi
2)	Tiantai	8)	Chaoxian Jurong (Chengjiang Academy of Agricultural Sciences
3)	Xiaoshan Jingyou (Zhejiang Academy of Agric. Sciences	9)	Yangzhou (Jiangsu Academy of Agricultural Sciences
4)	Fanchang	10)	Huaian
5)	Yixing		
6)	Wuxian		

Remark: The number of insects shown in the diagram is calculated in logarithm. Numbers in parentheses are numbers of insects on high peak days.

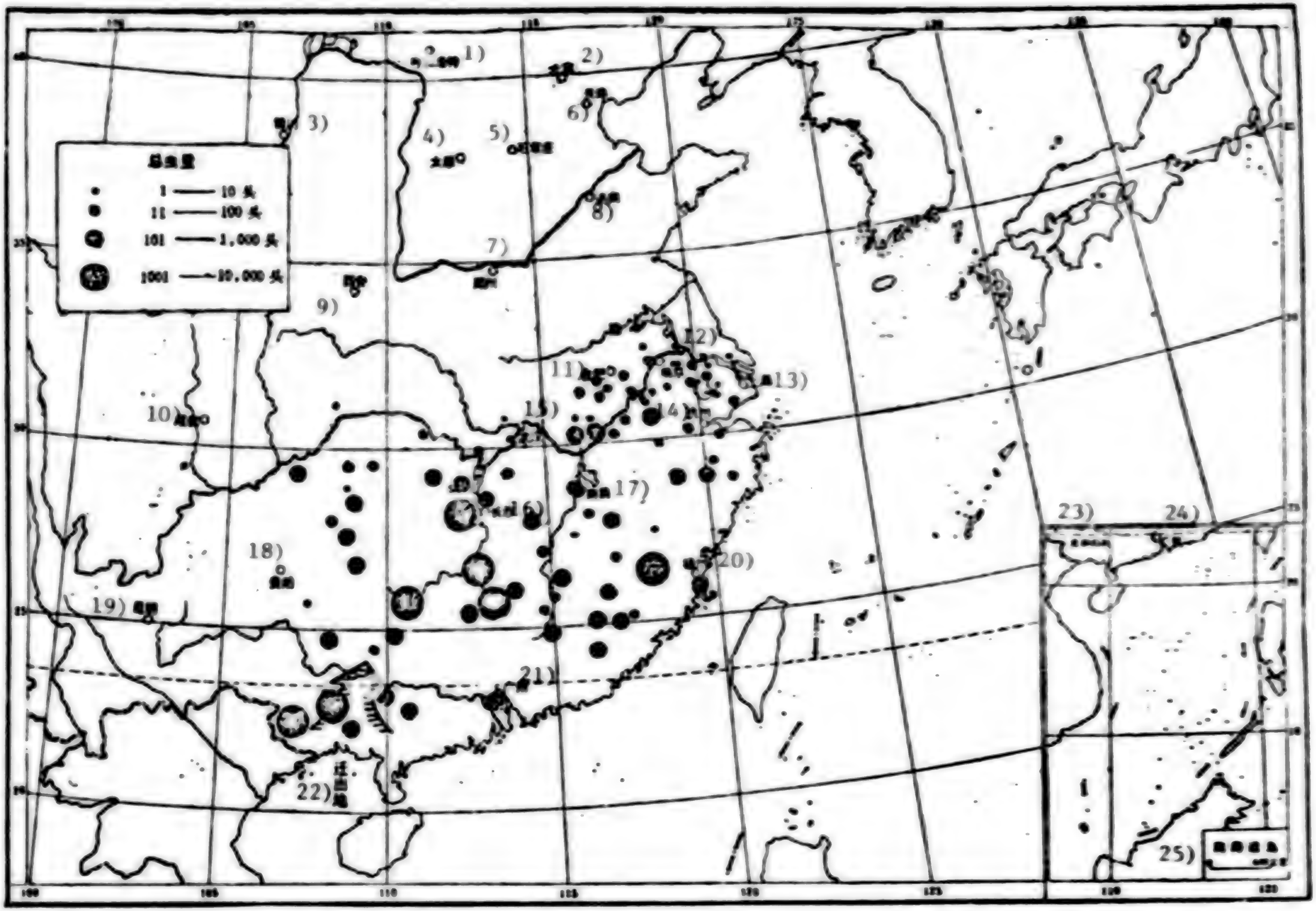


Figure 5. Distribution map of descent of f_r of inward migratory peak between 6/26--7/4, 1977

Key: [Figure 5]
1) Huhehot
2) Beijing
3) Yinchuan
4) Taiyuan
5) Shijiazhuang
6) Tianjin
7) Chengzhou
8) Jinan
9) Xian
10) Chengdu
11) Hefei
12) Nanjing
13) Shanghai
14) Hangzhou
15) Wuhan
16) Ghangsha
17) Nanchang
18) Guiyang
19) Kunming
20) Fuzhou
21) Guangzhou
22) Region of outward migration
23) Tropic of Cancer
24) Guangzhou
25) South Sea Islands 0__________440 kilometers
26) Total number of insects: 1--10 insects
11--100 insects
101--1,000 insects
1,001--10,000 insects

(Figure 5) spanning over 1000 kilometers from the southwest toward the northeast between 25°N latitude and 34°N latitude, i.e., from the northwestern part of Guangxi and southern part of Hunan to the northern parts of Jiansu and Anhui emerged. At the time, "simultaneous and sudden increases" occurred at over 100 areas in the 10 provinces and city of Guangxi, Hunan, Hubei, Jiangxi, Fujian, Anhui, Zhejiang, Jiangsu, Shanghai, Sichuan and Guizhou underneath lamps and in the fields and even at the 6 mountain localities including Hengshan and Huangshan where concerned units set up large insect nets on high mountains. This phenomenon occurred 11 times in the same year during the time of migratory flights from south to north (Table 3).

We believe this "simultaneous and sudden increase" is characteristic of all colonies of species of insects that migrate over long distances. The effect of air currents that affected the course of migratory landing of the insects led the insects to simultaneously spread over a wide area. If one believes that the nilaparvata lugens reproduces offspring after wintering at the original locality, then how can they "simultaneously and suddenly increase" over such a vast area covering so many extremely different planting systems and natural conditions!

2. Pattern of distribution of the number of insects in regions of "simultaneous and sudden occurrences"

In 1977 we statistically analyzed the investigative and observational data at each point in combination with data on luring the insects in the same periods at each locality. It can be seen that in one peak migratory flight of the nilaparvata lugens, the number of insects at each of the localities entered by the migratory insects decreases as the distance

1)表3 1977年春、夏季稻飞虱在我国东半部地区的北迁过程和峰次

2) 北迁过程	3) 峰次	4) 高峰期（高峰日）	5) 迁出地	6) 迁入地		9) 特点
				7) 主降区	8) 波及区	
M_1	f_1	4/12—15 (4/14)	10)19°N以南的终年繁殖区(海南岛南部、中南半岛中部以南的中热带地区)	11)海南岛中部与北部及同纬度其它地区	12)北回归线以南的两广南部	13)迁入虫量少,高峰不明显,是本发生区南面地区的迁入峰的波及区
	f_2	4/29—5/5 (5/4—5)	14)同　上	15)两广南部	16)23°—26°N间南岭地区,包括广东和广西北部、湖南、江西、福建、贵州的南部	17)迁入虫量多,波及范围广
M_2	f_3	5/13—15	18)19°N以北(海南岛中部以北及中南半岛同纬度地区)	19)两广南部	20)南岭区	21)迁入虫量少
	f_4	5/25—6/2 (5/25、5/30)	22)同　上	23)两广大部及南岭区	24)沿江区南部	25)常年为迁入南岭区的主要迁入峰,今年虫量不多,波及到沿江区
M_3	f_5	6/8—12 (6/9)	26)[illegible]°—22°N之间,两广南部的早熟早稻田	27)南岭区	28)沿江区南部	29)沿江区个别始见期
	f_6	6/15—17 (6/15)	30)两广南部的早熟早稻田	31)南岭区	32)岭北区及长江以南苏南、皖南等地	33)沿江区普遍始见期
	f_7	6/26—7/4 (6/28、7/3)	34)两广南部中、晚熟早稻田	35)南岭区、岭北区、沿江区南部	36)长江中、下游绝大部分地区	37)迁入虫量多,为主要迁入峰
M_4	f_8	7/8—10	38)南岭区,包括广东北部、广西北部、湖南南部、江西南部的早熟早稻田	39)沿江区,湖北、江西中北部,浙江及江苏、安徽两省南部	40)江淮和淮北区	41)沿江区主要迁入峰,江淮区常年始见期
	f_9	7/15—16	42)南岭区,包括湖南、江西两省南部、中部等地	43)长江中、下游的沿江区	44)江淮和淮北区	45)沿江区主迁入峰期,淮北区始见期
	f_{10}	7/21—24	46)岭北区、沿江区南部、长江中、下游的早熟早稻田	47)长江中、下游及江淮区	48)淮北区	49)常年江淮区的迁入峰
M_5	f_{11}	7/29—8/5	50)沿江区偏南部中晚熟早稻田及南岭以北山区的迟发早稻田	51)沿江区北部直至淮北区		52)常年为江淮区主要迁入峰

M_1……M_5 北迁过程的代号
f_1……f_{11} 北迁峰次的代号　53)

Key: [Table 3]

1) Table 3. The Path of Northward Migratory Flight and the Number of Peak Occurrences of the Nilaparvata Lugens in Spring and Summer of 1977 Over Our Nation's Eastern Half

2) Path of northward migration

3) Number of peak occurrences

4) High peak periods (high peak days)

5) Location of outward migration

6) Regions of inward migration

7) Major regions of descent

8) Spillover regions

9) Characteristics

10) The region of year-round propagation south of the 19°N latitude (southern part of Hainan Island, central part of Indochina Peninsula of the mid-tropical zone)

11) Central and northern parts of Hainan Island and other regions on the same latitutde

12) Southern parts of Guangdong and Guangxi south of the Tropic of Cancer

13) The number of insects migrating into these regions is small. There is no obvious high peak. The insects are spillovers from the peak migratory influx into the southern regions of this occurrence region

14) Same as above

15) Southern parts of Guangdong and Guangxi

16) Nanling region between 23°N latitude and 26°N latitude, including Guangdong and northwest Guangxi, Hunan, Jiangxi, Fujian, southern Guizhou

17) The number of insects migrating into these regions is large and the spillover spans a wide area

18) North of 19°N latitude (north of central Hainan Island and regions of the Indochina Peninsula on the same latitude)

19) Southern parts of Guangdong and Guangxi

20) Nanling region

21) The number of insects migrating into these regions is small

22) Same as above

23) Most of Guangdong and Guangxi and Nanling region

24) Southern part of the Yanjiang region

25) In ordinary years, these regions are the regions of major peaks of influx of migration into the Nanling region. The number of insects this year is not large. Spillovers have spread into the Yanjiang region.

26) Between 21°N and 22°N latitudes, early maturing early rice fields in the southern parts of Guangdong and Guangxi

27) Nanling region

28) Southern part of the Yanjiang region

29) This is the region of first instances of individual occurrence in the Yanjiang region

30) Early maturing early rice fields in the southern parts of Guangdong and Guangxi

31) Nanling region

[continuation of Key to Table 3]

32) Lingbei region and southern regions of Jiangsu and Anhui south of Changjiang
33) This is the region of first instances of common occurrence in the Yanjiang region
34) Intermediate and late maturing early rice fields of the southern parts of Guangdong and Guangxi
35) Nanling region, Lingbei region, southern parts of Yanjiang region
36) Absolute majority of the regions of the middle and lower reaches of the Changjiang
37) The number of insects migrating into these regions is large. They are the regions of major influx peaks.
38) Nanling region including the early maturing early rice fields in northern Guangdong, northern Guangxi, southern Hunan, southern Jiangxi
39) Yangjiang region, central and northern parts of Hubei and Jiangxi, Zhejiang, and southern parts of Jiangsu and Anhui
40) Changjiang and Huai River regions and regions north of the Huai River
41) These are the regions of major influx peaks in the Yanjiang region and the regions of first instances in ordinary years in the Changjiang and Huai River regions
42) Nanling region including the southern and central parts of Hunan and Jiangxi provinces
43) Yanjiang region at the middle and lower reaches of the Changjiang
44) Changjiang and Huai River regions and region north of the Huai River
45) These are the regions of major influx peaks in the Yanjiang region and the regions of first instances in the region north of the Huai River
46) Lingbei region, including the early maturing early rice fields in the southern parts of the Yanjiang region, and the middle and lower reaches of the Changjiang
47) Middle and lower reaches of the Changjiang and regions of the Changjiang and Huai rivers
48) Region north of the Huai River
49) These are regions of influx peaks in the Changjiang and Huai River regions in ordinary years
50) The intermediate and late maturing early rice fields in the southern parts of the Yanjiang region and the late developing early rice fields of the mountain regions north of Nanling
51) From the northern part of the Yanjiang region to the region north of the Huai River
52) These are regions of major influx peaks in the Changjiang and Huai River regions in ordinary years.
53) M_1..........M_5 are symbols for each northward migration
f_1..........f_{11} are symbols of the numbers of peaks of northward migration

of migration increases, i.e., the farther away the locality from the insect source, the smaller the number of insects. Figures 5 and 6 show that between June 26 and July 4 of 1977 during the yellow ripe stage of early rice in the southern regions of Guangdong and Guangxi provinces, distribution of the number of insects of peak migration into the region from the northern part of the Nanling region to the Changjiang River Valley indicates the insects migrated from Nanning in Guangxi Province. All localities 3 to 6 latitudes from the place left by the migratory insects (within a range of 300 to 700 kilometers) where over 1,000 and up to nearly 10,000 insects have accumulated under the field lamp during one peak and where peak inward migrations occur are the landing centers of the major areas of descent of this migratory peak. All localities 6 to 9 latitudes from the place left by the migratory insects (700 to 1,000 kilometers) where several hundred to nearly 1,000 insects have accumulated under the field lamp during this peak inward migration are areas where the number of insects suddenly increase and they also belong to the major area of descent. All regions 10 latitudes from the place left by the migratory insects and beyond where the number of insects attracted by the insect luring lamps is small and inward migration is sporadic are regions of spillover. Localities 15 latitudes from the place left by the migratory insects and beyond where the emergence of insects under the lamp is the first occurrence of the year are the border regions of the spillover of this inward migratory peak.

Correlative analysis of the relationship between the total number of insects attracted by the lamps at 51 locations shown in Figure 6 and the linear distance of these 51 locations from the locality of the source of insects shows an obvious negative correlation, $r = -0.9535$, the correlation is extremely obvious, P 0.01, the correlative equation $y = 4-0.002x$, indicating that the further away from the locality of the source of insects brings about a 1/10 decrease in the number of insects that descend.

(6) Observations of the Actual Migratory Flights From the South to the North and Back of the Nilaparvata Lugens in 1977 in the Eastern Half of Our Nation

In 1977, data gathered by actual observation and investigation at eight stations set up in each paddy rice region of our nation to observe migratory flights and data on the conditions of seedlings and insects provided by each insect pest observation station were analyzed. It was discovered that in that year there were five migratory flights from south to north in the eastern half of our nation, and beginning from the last 10 days of August, there were three migratory flights from north to south. During each of the migratory flights, several inward and outward migratory peaks occurred frequently because of differences in the localities the insects left and differences in the fields at the locality of the source of the insects, or because of weather conditions at the time. These peaks are listed in Figures 7 and 8 and Tables 3 and 4, and they are briefly described in the following:

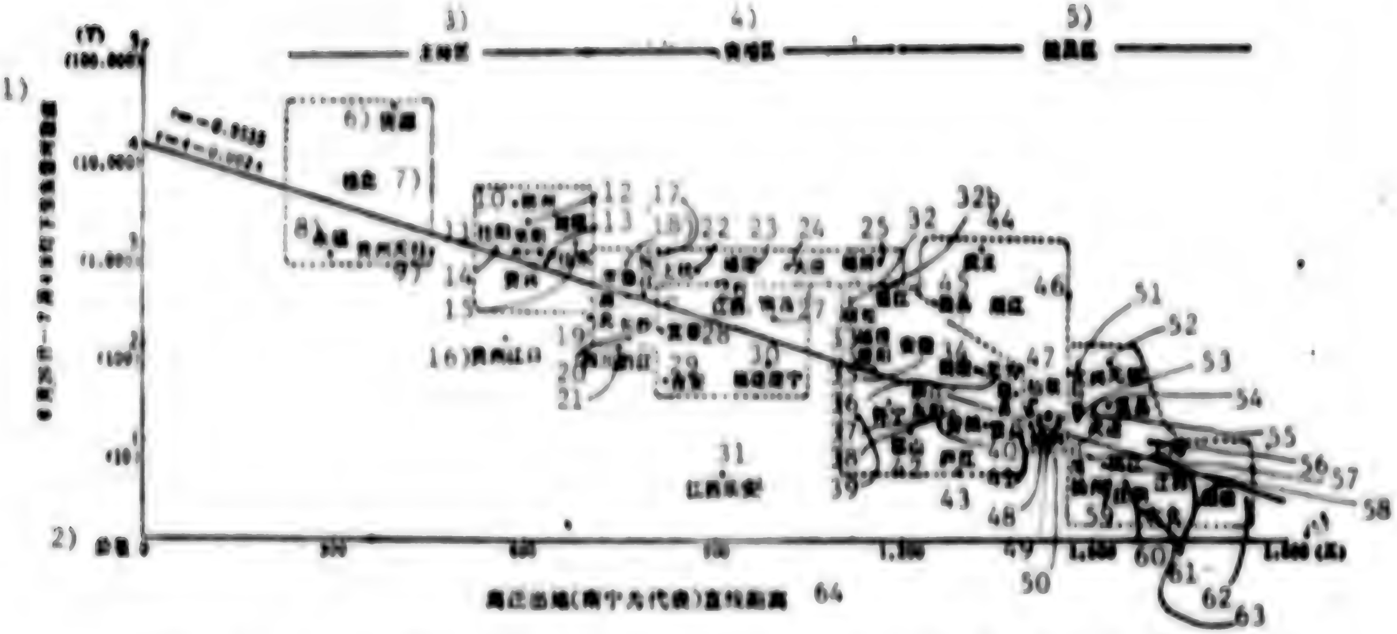
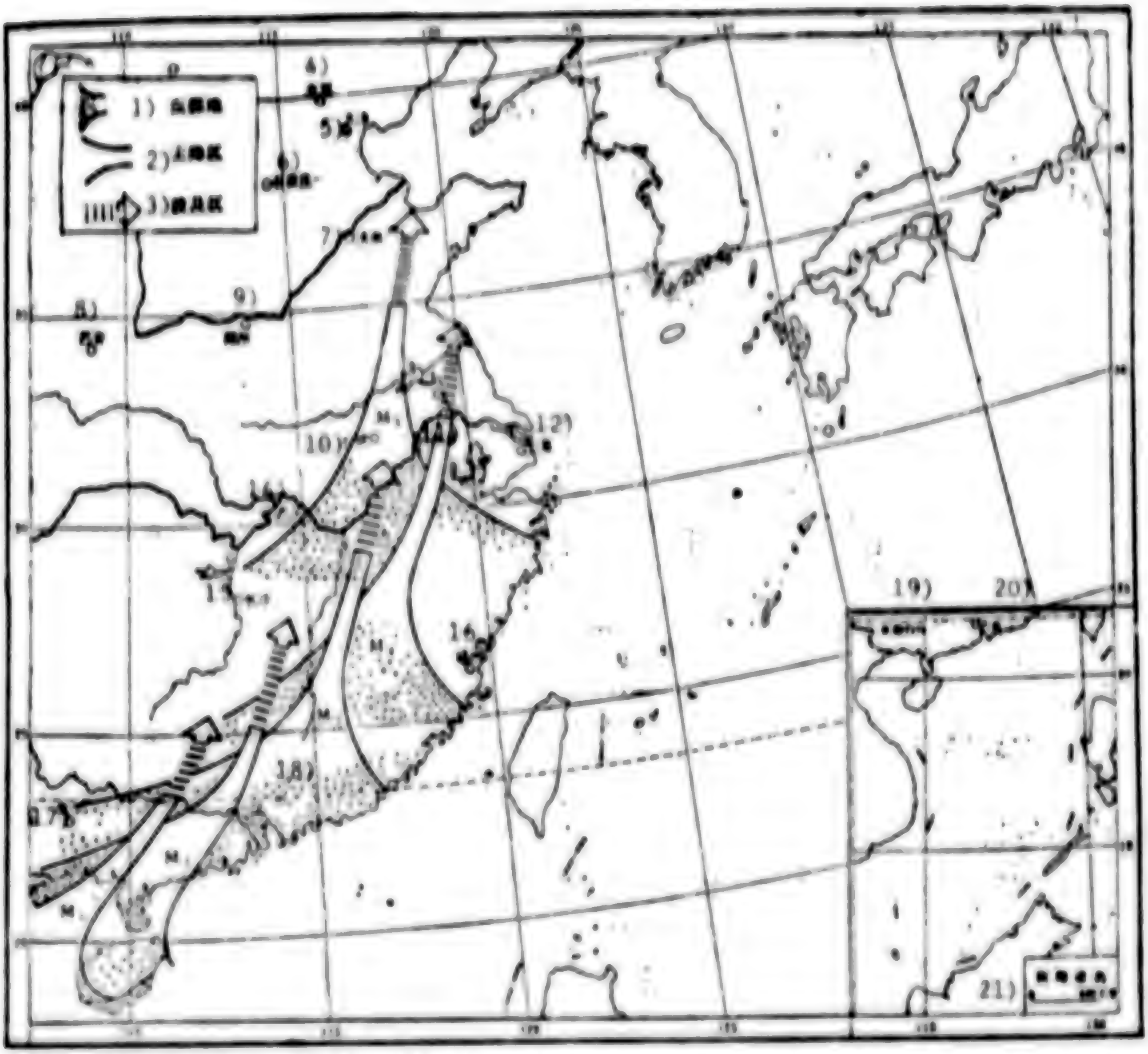


Figure 6. Relationship between distance of location of outward migration and number of descended insects at each locality during the f_7 migratory peak in 1977

Key: 1) Logarithmic values of total number of insects under the lamp

2) kilometer
3) Major region of descent
4) Region of sudden increases
5) Spillover region
6) Ziyuan
7) Northern Guangxi
8) Yongfu
9) Tianzhu in Guizhou
10) Chenzhou
11) Guiyang
12) Laiyang
13) Southern Hunan
14) Xiushan in Sichuan
15) Guidong
16) Jiangkou in Guizhou
17) Yuanjiang
18) Changde
19) Northern Hunan
20) Changsha
21) Yinjiang in Sichuan
22) Shanghang
23) Fujian
24) Tatian
25) Fuqing
26) Jiangxi
27) Nanchang
28) Yichun
29) Jian
30) Jianning in Fujian
31) Lean in Jiangxi
32) Wangjiang
32b) Shusong
33) Jiangyang in Fujian
34) Anhui
35) Nanling
36) Wuwei
37) Shexian
38) Dongyang in Zhejiang
39) Huaining
40) Shucheng
41) Fanchang
42) Huoshan
43) Lujiang
44) Wuyi
45) Quxian
46) Zhejiang
47) Xianju
48) Linan
49) Huanshan
50) Xhaoxing
51) Yixing
52) Wuxi
53) Juring
54) Wuxian
55) Wujin
56) Shanghai
57) Jiangpu
58) Wujiang
59) Yangzhou
60) Jiangying
61) Jiangsu
62) Ganyu
63) Taicang

64) Linear distance from location of outward migration (represented by Nanning)



M_1 First northward migration (middle 10 days of April to first 10 days of May);
M_2 Second northward migration (middle 10 days of May to first 10 days of June);
M_3 Third northward migration (middle and last 10 days of June to beginning of July);
M_4 Fourth northward migration (first and middle 10 days of July);
M_5 Fifth northward migration (last 10 days of July to first 10 days of August).

Figure 7. Migratory flight path of the nilaparvata lugens to the north in spring and summer of 1977 over our nation's eastern half

Key:
1) Location of insect source
2) Major region of descent
3) Spillover region
4) Beijing
5) Tianjin
6) Shijiazhuang
7) Jinan
8) Xian
9) Chengzhou
10) Hefei
11) Nanjing
12) Shanghai
13) Hangzhou
14) Wuhan
15) Changsha
16) Fuzhou
17) Nanning
18) Guangzhou
19) Tropic of Cancer
20) Guangzhou
21) South Sea Island

0______________440 kilometers

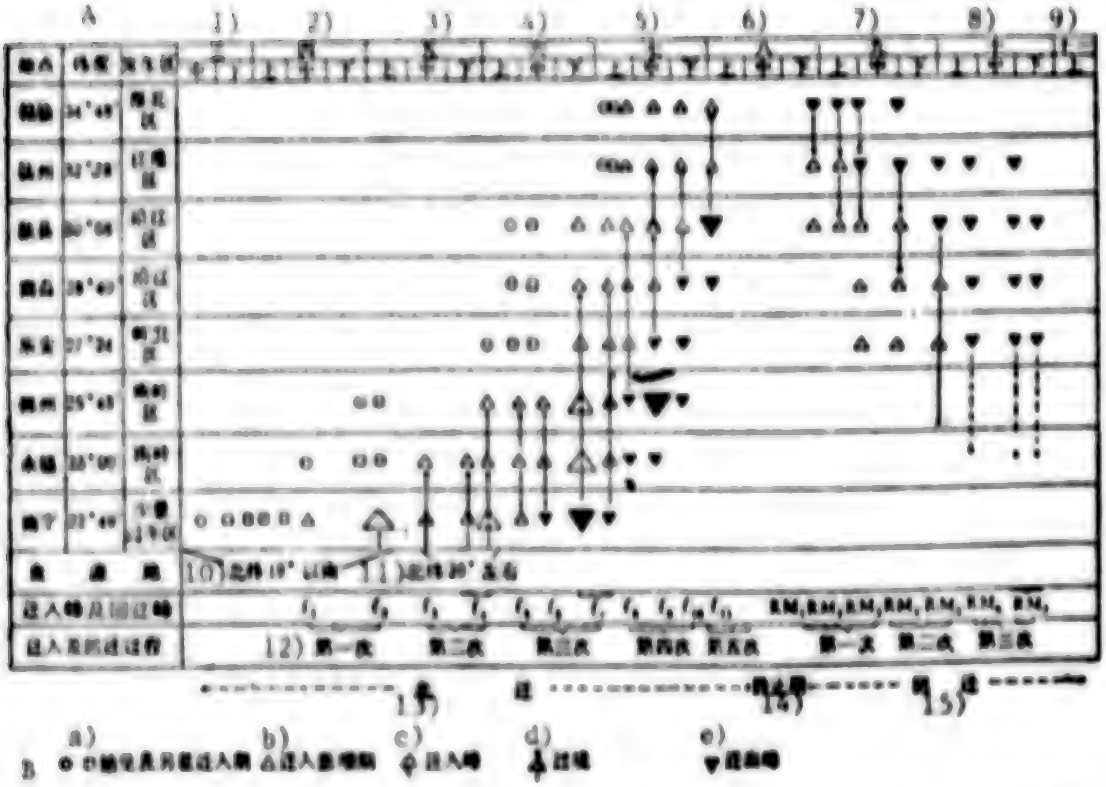


Figure 8. Illustrative graph of the inward and outward migration of the nilaparvata lugens at localities in our nation in 1977

Key:

A--Location	Latitude	Region of Occurrence
Ganyu	34° 48'	Region north of the Huai River
Yangzhou		Changjiang and Huai River region
Shexian		Yanjiang Region
Nanchang		Yanjiang Region
Lean		Lingbei region
Chenzhou		Nanling region
Yongfu		Nanling region
Nanning		Region of wintering of a few

place of source of insects

Peak of inward migration and peak of return migration

Course of inward migration and return migration

B--a) Period of first instances and sporatic inward migration

b) Period of sudden increase in inward migration

c) Peak inward migration

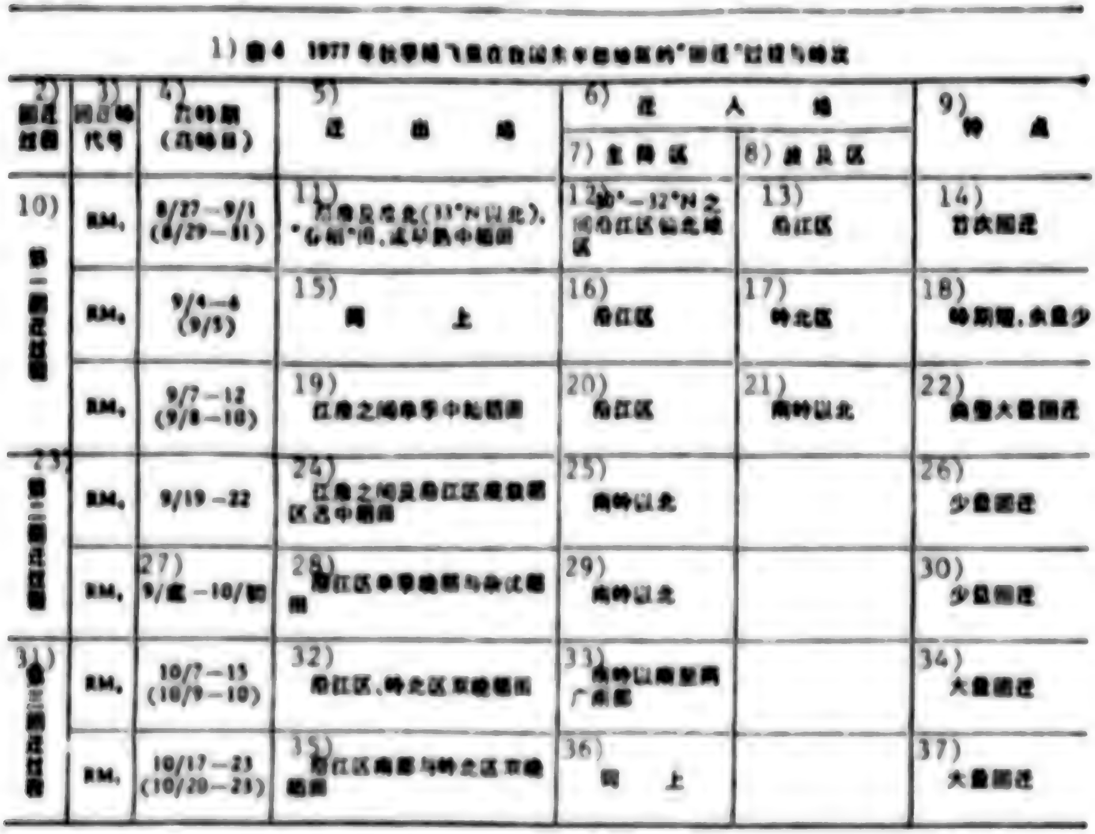
d) Transit

e) Peak outward migration [key continued]

[continuation of Figure 8 key]

1) March--middle, last
2) April--first, middle last
3) May
4) June
5) July
6) August
7) September
8) October
9) November--first (10 days)
10) South of 19°N latitude
11) About 20°N latitude
12) first second third
fourth fifth
first second third
13) Northward migration
14) Stationary period
15) Return migration

Table 4. Course of "Return Migrations" and the number of peaks of Occurrence of the Nilaparvata Lugens in Autumn, 1977, in Our Nation's Eastern Half



1) [illegible] 1977 [illegible]

2) [illegible]	3) [illegible]	4) [illegible]	5) [illegible]	6) [illegible] 7) [illegible]	6) 8) [illegible]	9) [illegible]
10) [illegible]	RM,	8/27—9/1 (8/29—31)	11) [illegible]	12) 30°—32°N [illegible]	13) [illegible]	14) [illegible]
	RM,	9/4—6 (9/5)	15) 同 上	16) [illegible]	17) [illegible]	18) [illegible]
	RM,	9/7—12 (9/8—10)	19) [illegible]	20) [illegible]	21) [illegible]	22) [illegible]
23) [illegible]	RM,	9/19—22	24) [illegible]	25) [illegible]		26) [illegible]
	RM,	27) 9/[illegible]—10/[illegible]	28) [illegible]	29) [illegible]		30) [illegible]
31) [illegible]	RM,	10/7—15 (10/9—10)	32) [illegible]	33) [illegible]		34) [illegible]
	RM,	10/17—23 (10/20—23)	35) [illegible]	36) 同 上		37) [illegible]

Key:

1) Table [title]
2) Return migration
3) Symbols of migratory peaks
4) High peak periods
(high peak days)
5) Region of outward migration
6) Regions of inward migration
7) Major descending region
8) Spillover regions
9) Characteristics
10) First return migration

[key continued]

11) Yanjiang, Huai River and north of the Huai River (north of 33°N latitude) in the "spring rice" fields or the early maturing intermediate rice fields
12) Northern areas of the Yanjiang region between 30°N and 32°N latitudes
13) Yanjiang region
14) First return migration
15) Same as above
16) Yanjiang region
17) Lingbei region
18) Peak period is short, number of insects is small
19) Single season intermediate xian rice fields between Changjiang and Huai River
20) Yanjiang region
21) North of Nanling
22) Typical massive return migration
23) Second return migration
24) Fields of late and intermediate rice in the mix rice regions of the Yanjiang region and between the Changjiang and Huai River
25) North of Nanling
26) Return migration of a small number
27) End of September to beginning of October
28) Fields of single season late rice and hybrid superior rice in the Yanjiang region
29) North of Nanling
30) Return migration of a small number
31) Third return migration
32) Double season late rice fields in the Yanjiang region and the Lingbei region
33) South of Nanling to the southern parts of Guangdong and Guangxi
34) Massive return migration
35) Double season late rice fields of the southern part of the Yanjiang region and the Lingbei region
36) Same as above
37) Massive return migration

It can be seen from the diagrams and tables mentioned above that the migratory flights of the nilaparvata lugens are shingled (overlapping). The insects migrate from south to north in spring and summer, and return from the north to the south in autumn. Therefore, all the regions of occurrence are reciprocal localities of the source of insects. In the course of each migratory flight, there are major regions where the insects migrate into (called major regions of descent) and also spillover regions covering a much wider area where a small number of insects are found.

Actual migratory flights of the nilaparvata lugens between north and south in the eastern half of our nation during the past 3 years show that the migratory flights, or the major area of descent of peak migrations, the central region of descent and the number of insects that have descended may vary due to differences in the number of insects of the source and weather conditions in each year, but the route of the migratory flight and the course of each large migration generally remain stable. This may be because the planting systems of each paddy rice region, the maturation and harvesting times of paddy rice and the seasonal climates are relatively stable.

(7) Preliminary Discussion of the Migratory Flight Paths Between North and South and Zoning the Regions of Occurrence of the Nilaparvata Lugens in the Eastern Half of Our Nation

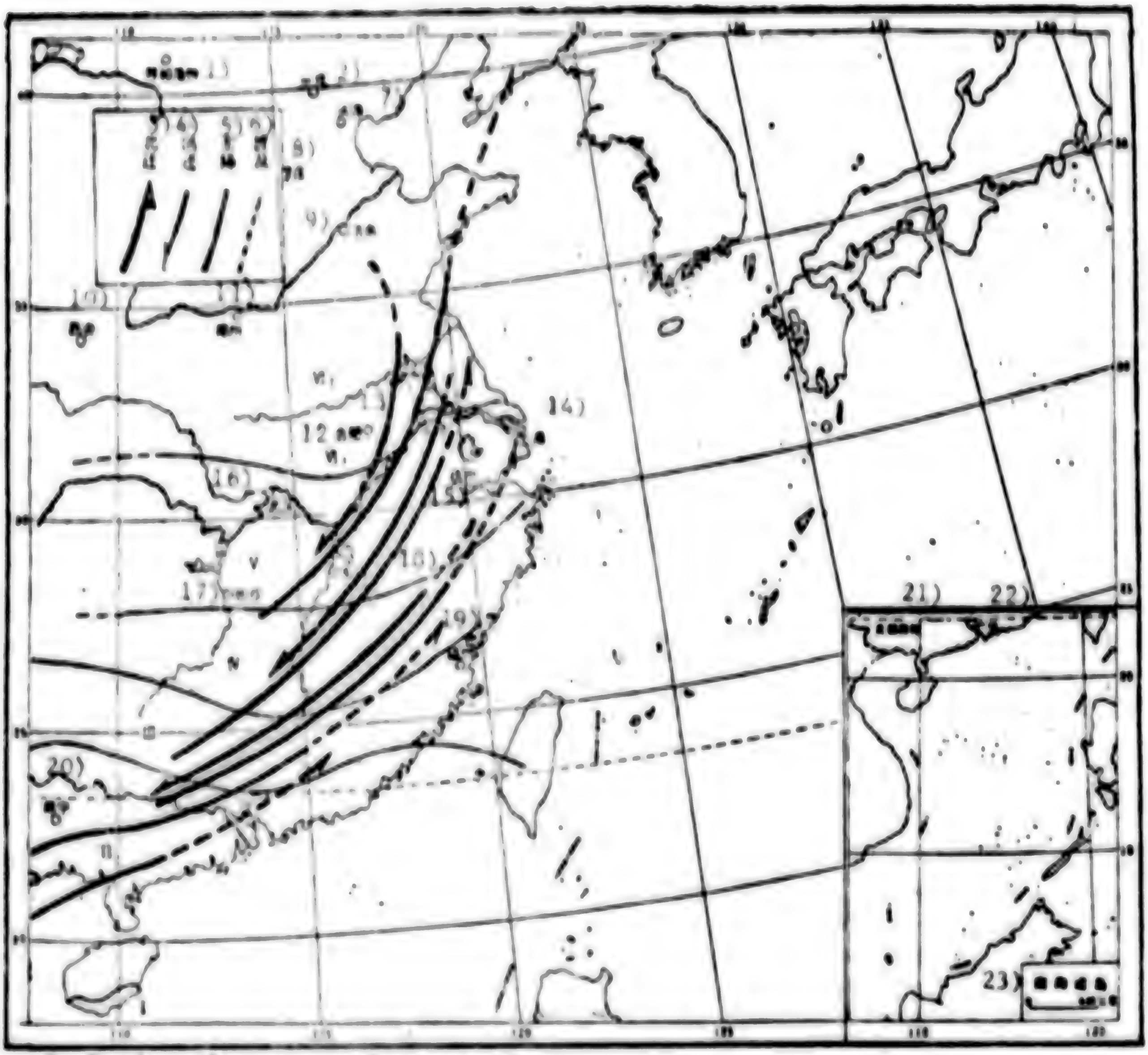
Zoning the regions of damage due to the occurrence of the nilaparvata lugens is based on those regions with similar "simultaneous and sudden occurrences," similar generations of insects and similar types of seasonal occurrences of colonies of species of insects. The boundary limits of each region are based on the actual occurrences of recent years on the one hand and references on climatic and insect zones on the other hand. A tentative zoning of six regions of occurrence of the nilaparvata lugens in the eastern half of our nation is as follows (Figure 10).

I. Region of Year-Round Propagation

Situated south of 19°N latitude or south of the 19°C isotherm in January, the region includes Hainan Island and Yaxian, Linshui and Ledong south of the dividing ridge of Wuzhishan. The lowest extreme temperature in winter in this region is above 12°C. Paddy rice grows year-round. Large areas of early rice mature in April and May. The nilaparvata lugens can reproduce and cause damage year-round. Thirteen generations can be reproduced a year. The peak occurrence and outward migration of long-winged adults in the early rice fields occur before the middle 10 days of May. Although this region of occurrence is relatively small in our nation, it can reflect the manner of occurrence of the nilaparvata lugens in winter and spring in areas of the Indochina Peninsula along the same latitude.

II. Region of Wintering of a Few

Situated north of the 19°N latitude and extending north to near the Tropic of Cancer (23°26'N latitude), the region includes the southern parts of Guangdong and Guangxi, central and northern parts of Hainan Island and some parts of southern Fujian. In ordinary years, this region's average January temperature is above 12°C. Between 8 and 11 generations of nilaparvata lugens are reproduced each year. The greatest number of insects occurs in spring and autumn damaging early and late rice crops. The seasonal growth and decline of colonies of species can be represented by a saddle curve. Two subregions can be demarcated according to the wintering habits and the generations that occur in ordinary years:



- I Region of year-round propagation
- II Region of wintering of a few
- III Nanling region of 6 to 7 generations
- IV Lingbei region of 5 generations
- V Yanjiang region of 4 generations
- VI_1 Changjiang and Huai River region of 3 generations
- VI_2 Region north of the Huai River of 2 generations

Figure 10. Model map of the migratory flight paths and zoning of regions of occurrence of the nilaparvata lugens in the eastern half of our nation

Key: [see next page]

[Key to Figure 10]

1) Huhehot
2) Beijing
3) Northward migration
4) Return migration
5) Major descent
6) Spillover
7) Tianjin
8) Shijizhuang
9) Jinan
10) Xian
11) Chengzhou
12) Hefei
13) Nanjing
14) Shanghai
15) Hangzhou
16) Wuhan
17) Changshu
18) Nanchang
19) Fuzhou
20) Nanning
21) Tropic of Cancer
22) Guangzhou
23) South Sea Island 0__________440 kilometers

II$_1$ The stable wintering region of a few (or the Lei Qiong region of 9-11 generations)

Situated south of 21°N latitude, this region includes the central and northern parts of Hainan Island and the southern tip of Leizhou Peninsula. In ordinary years, the average January temperature is above 14°C. A stable but small number of nilaparvata lugens winter in the region. In Qionghai County in the Central part of Hainan Island, 11 generations of insects may emerge in a whole year. Early rice in this subregion matures between the last 10 days of May and the first 10 days of June. Occurrence of long-winged adult insects reach a peak and they migrate outward at this time.

II$_2$ Intermittent wintering region of a few (or the southern Guangdong and Guangxi region of 8 generations)

Approximately between 21°N and 25°N latitudes, this subregion includes the southern part of Guangxi, the coast of southern Guangdong and the Zhujiang River Valley, and Longxi in southern Fujian south of the Tropic of Cancer. Eight generations can emerge in a whole year. In years of warm winter and spring, a few insects can winter in various morphological forms on regenerative rice, or seedlings with premature grains and on the locally cultivated "Dong he." Early rice of this subregion matures from the middle and last 10 days of June to the beginning of July. Occurrence of long-winged adult insects also reaches a peak at this time and they migrate outward. The number of insects that intermittently winter locally is small. After plowing and raking and transplanting in early spring, the remnant number is even smaller. The nilaparvata lugens insects that are found on early rice are actually reproduced by those that have migrated into the region from tropical rice regions between March and May.

III. Nanling Region of Six and Seven Generations

Situated between the Tropic of Cancer and 26°N latitude, this region includes the northern parts of Guangdong and Guangxi, the southern parts of Hunan and Jiangxi provinces, the south of Guizhou and the central and southern parts of Fujian. Six to seven generations are reproduced in the whole year. The seasonal growth and decline of colonies of species can be represented by a saddle curve. The insects basically cannot winter here. Only a very few winter in the southern parts of this region in years when winter and spring are very warm. Early rice of this region is transplanted after the middle 10 days of April. Insects are observed to migrate into the region between the last 10 days of April and the beginning of May. Peak of inward migration occurs between the middle and last 10 days of May and the middle and last 10 days of June. Early rice matures during the first or middle 10 days of July, and occurrence of long-winged adults of nilaparvata lugens reaches a peak and they migrate outward at this time.

IV. Lingbei Region of Five Generations

Situated between 26°N and 28°N latitude, this region includes the middle and lower reaches of the Xiangjiang and Ganjianb, the north central regions of Fujian and Guizhou provinces, and southern Zhejiang. About five generations are reproduced a year. The seasonal growth and decline of the colonies of species can be represented by a saddle (curve). Early rice is transplanted between the last 10 days of April and the first 10 days of May, and matures during the middle and last 10 days of July. Long-winged adults are seen migrating into the region during the first and middle 10 days of May. Several peaks of inward migration occur between the middle and last 10 days of May and June. Long-winged adults migrate outward between the middle 10 days of July and the beginning of the last 10 days of the month. In late developing fields of early rice in mountain areas, the insects wait until the beginning of August to migrate outward.

V. Tanjiang Region and Southern Changjiang Region of Four and Five Generations

Situated between 28°N and 31°N latitude and reaching 32°N latitude at the lower reaches of the Changjiang, this region includes the northern parts of Hunan and Jiangxi provinces, most of Zhejiang, southeast of Sichuan, southern Jiangsu, southern Anhui and the Yanjiang region. Between four and five generations emerge in the whole year. Seasonal growth and decline of colonies of species can be represented by an ascending step graph. In ordinary years, a few long-winged adults are first seen to migrate into the region during the first and middle 10 days of June. A sudden increase in the number of insects occurs between the last 10 days of June and the beginning of July. After the first and middle 10 days of July, there are several peaks of inward migration. Between the middle and last 10 days of June and the beginning of July, a larger number of insects migrate into some of the southern areas of this region (at about 30°N latitude), and they often reproduce one generation at that locality. Between the last 10 days of July and first 10 days of August, the insects migrate to the northern parts of this region or further north. In this region, insect damage occurs mainly between the middle and last 10 days of September and the first 10 days of October during the panicle stage of single season late rice and double season late rice.

VI. Region of Two and Three Generations Along the Huai River

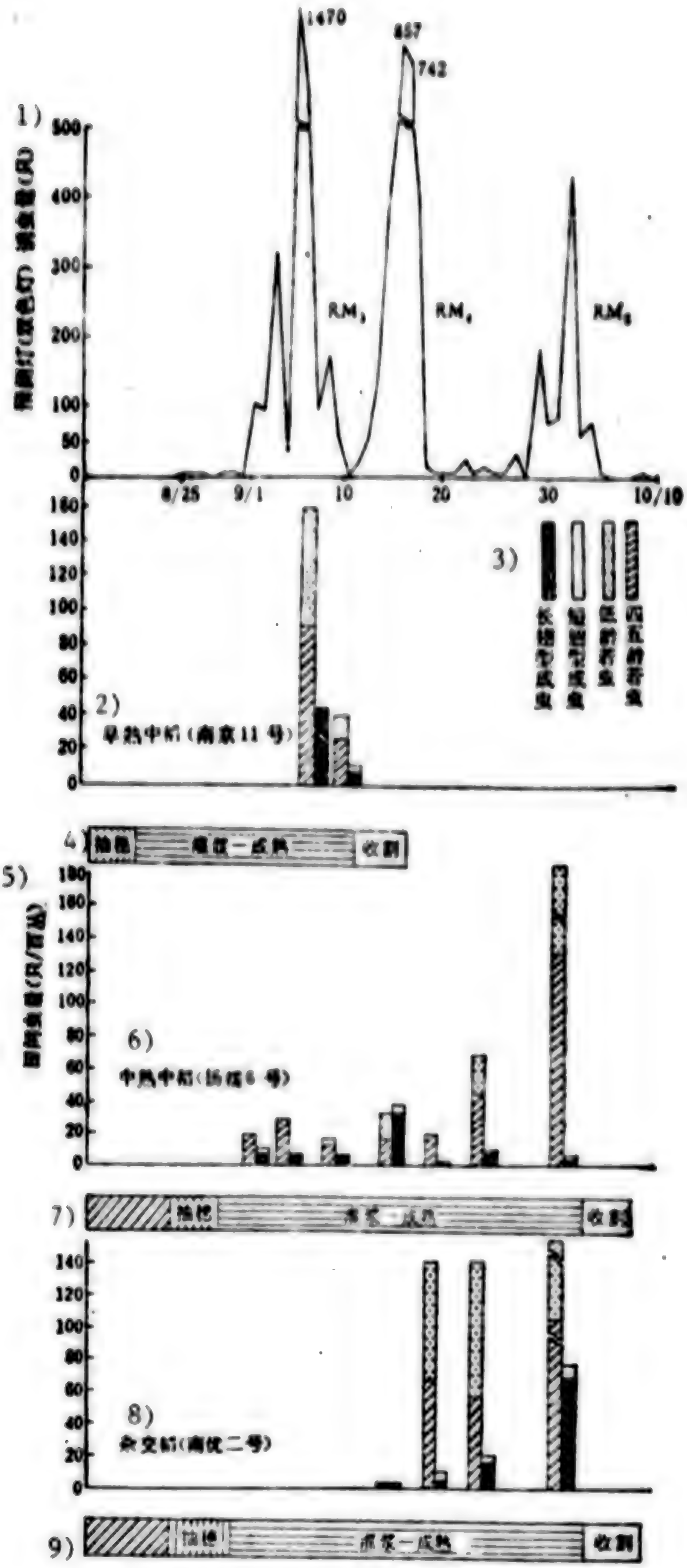
This region can be divided into two subregions:

VI$_1$ Region of three generations of the Changjiang and Huai Rivers

Situated between 31°N and 33°N latitudes and between 32°N and 34°N latitudes at the lower reaches of the Changjiang, this region spans from the north of Changjiang to the south of Huai River and Qinlin mountain. It includes Jiangsu, central Anhui, northern Hubei, southern Henan and southern Shaanxi. Two to three generations occur in the year. The seasonal growth and decline of colonies of species can be represented by an ascending step curve. A few long-winged adults emerge at the beginning of July. Several sudden increases in the number of insects occur during the middle and last 10 days of July but the number of insects is not large. A peak inward migration occurs between the last 10 days of July and the first 10 days of August. Paddy rice of this region is single season intermediate rice. The insects that migrate into this region during the first and middle 10 days of July reproduce two generations and cause damage to the crops between the last 10 days of August and the first 10 days of September. During the first and middle 10 days of September when some of the early and intermediate maturing intermediate xian rice of the region have reached the yellow ripe stage, long-winged adults begin to migrate south. Several peaks of return migration (Figure 9) occur during the first and middle 10 days of September, at the end of September, at the beginning of October and during the middle 10 days of October when hybrid superior rice and intermediate gent rice mature in succession.

VI$_2$. Region of two generations of the northern part of the Huai River

Situated between 33°N and 35°N latitudes, this region includes Anhui, northern Jiangsu and the new rice regions of southern Shandong. In ordinary years, occurrence of insects is slight and special preventive measures are unnecessary. Single season intermediate rice is planted in this rice region. The rice planted in the middle 10 days of May in winter fallow fields or as "spring rice" following green manure is mainly early maturing intermediate xian which matures during the first and middle 10 days of September. The rice transplanted is "summer rice" [illegible] the middle 10 days of June in fields left by the wheat crop is mainly intermediate geng rice which matures during the middle 10 days of October.



Key:

1) Number of insects attracted by the forecast lamp (double color lamp)
2) Early maturing intermediate rice (Nanjing No 11)
3) a. long-winged adult
   b. short-winged adult
   c. young nymphs
   d. nymphs of 4 and 5 ages
4) Heading,
   Filling-Maturation
   Harvesting
5) Number of insects in the field (one/hundred plants)
6) Intermediate maturing intermediate rice (Yangnuo No 6)
7) Heading
   Filling-Maturation
   Harvesting
8) Hybrid rice (Nanyou No 2)
9) Heading
   Filling-Maturation
   Harvesting

Figure 9. Relationship between the growth periods of several major intermediate rice varieties in the Changjiang and Huai River regions and the period of peak occurrence and outward migration of the nilaparvata lugens (1977, Yangzhou)

A few long-winged adult insects migrate into the region at the beginning of July. Several sudden increases in the number of insects occur during the first and middle 10 days of July. The insects mainly migrate into "spring rice" fields. A visible peak of inward migration occurs between the end of July and the beginning of August. The insects mainly migrate into "summer rice" fields. After reproducing two generations in the "spring rice" fields the insects migrate from north to south for the first time between the end of August and the first and middle 10 days of September.

The nilaparvata lugens insects also occur scattered throughout the rice regions of northern China and the Liaohe River Valley in the northeast. They have not caused any disaster. In ordinary years, only one to two generations are reproduced. Further investigation is needed to understand the scattered occurrences in these regions.

The migratory flight paths of the nilaparvata lugens between north and south of the eastern half of our nation have been preliminarily determined as follows according to observations made during the past 3 years, and especially on the basis of data gathered by systematic observation made at the migratory flight observation points set up in each rice region in 1977, and analytical results of the data on insect pests provided by each of the insect pest observation stations.

In ordinary years, the nilaparvata lugens insects begin to migrate in small and scattered numbers into the southern parts of Guangdong and Guangxi provinces of our nation around the middle 10 days of March. Several peaks of inward migration occur between the middle and last 10 days of April and the first 10 days of May. These constitute the first "northward migration." The insects migrate from the region of year-round propagation south of the 19°N latitude and descend mainly at the southern parts of Guangdong and Guangxi, the Zhujiang River Valley and southern Fujian between 20°N and 23°N latitudes. Between the middle and last 10 days of May and the beginning of June, the second "Northward migration" occurs. The insects migrate from north of the central part of Hainan Island and regions of the Indochina Peninsula along the same latitude into the southern parts of Guangdong and Guangxi and the Nanling region of our nation, and they become the early effective source of insects in the Nanling region. The third "northward migration" occurs between the middle and last 10 days of June and the beginning of July. The insects migrate from the southern rice regions of Guangdong and Guangxi to north of the Nanling region and spill over to the southern banks of Changjiang. The fourth "northward migration" occurs during the first and middle 10 days of July. The insects migrate from southern and northern rice fields of the Nanling region mainly into regions at the middle and lower reaches of the Changjiang and spill over to the Huai River Valley. The fifth "northward migration" occurs between the last 10 days of July and the first 10 days of August. The insects migrate from the Lingbei region and the southern regions south of the Changjiang and the Yanjiang region to the rice regions between the Changjiang and Huai River and north of the Huai River.

Between the last 10 days of August and the first 10 days of September, the insects follow the maturation of early maturing intermediate rice in the Yanjiang region and north of the Huai River and begin their return migration to the south. During the middle 10 days of September, a peak of return migration from regions between the Changjiang and Huai River to regions south of the Changjiang occurs. Between the last 10 days of September and the first 10 days of October, the insects migrate from the middle and lower reaches of the Changjiang to the Nanling region. From the middle 10 days of October to November, the insects migrate from regions south of the Changjiang and the Lingbei region to southern China and regions further south. Based on the above study and analysis, a preliminary model diagram (Figure 10) of the routes of migratory flight and zones of occurrence of the nilaparvata lugens in the eastern half of our nation has been presented.

Discussion

A summary view of the results of studies of the patterns of occurrences of the nilaparvata lugens in our nation and foreign nations and the work we have done in recent years indicate that the nilaparvata lugens is a destructive migratory insect that migrates over long distances. Because it has an obvious monophagy toward paddy rice, it likes warmth, it has a weak tolerance to cold, and it does not possess true hibernating and wintering characteristics, therefore it cannot exist and continue to grow in winter seasons when there are no rice seedlings in the fields of the large rice regions of our nation. The "sudden increase" of long-winged adult insects occurring in spring and summer the second year is due to consecutive migrations from regions of year-round propagation in the south. Although various morphological types can exist and live in small numbers on local regenerative rice seedlings in regions south of the Tropic of Cancer in years of warm winter and spring, after tilling and raking and transplanting in early spring, the base number of remnant insects is very small. The nilaparvata lugens insects that damage the early rice fields in spring at these localities mainly come from regions of year-round propagation in the tropic zone by migration.

The migratory flights of the nilaparvata lugens insects in spring and summer of each year from south to north overlap. In autumn, the insects migrate back to the south from the north. This is the result of the conflict between the insect's own biological characteristics and external environment. Climatically, our nation is situated in the East Asian region of special circular currents of seasonal winds. This constitutes the external condition of the back and forth migration. In spring and summer, the subtropic high pressure system increases in intensity and moves toward the north. In autumn the system weakens and retreats toward the south. A continental high pressure system emerges and moves toward the east and south. These provide the motive force for the nilaparvata lugens to migrate from south to north and from north to south. The field of high altitude air currents--southwesterly wind and northeasterly wind--formed by the rise and decline of these two high pressure systems provides a transport medium for the nilaparvata lugens in its migratory flight from south to north. The advances and retreats toward the north and toward the south by these two large high pressure systems in different seasons move the cold and warm air masses above our nation's rice fields and the weather fronts resulting from their encounter are one of the conditions forcing the migratory nilaparvata lugens to descend (15). Each migratory flight from south to north occurs within the region between the north side of the secondary high pressure ridge line and the trough line (shear zone).

Under the seasonal climate of the East Asian region, alternations and successions of the seasons of paddy rice cultivation and growth in our nation's southern and northern rice regions also provide food for the nilaparvata lugens. The inner mechanism of long distance migratory flight of the nilaparvata lugens still awaits further study.

During the past 10 years, along with the reformation of paddy rice planting systems in our nation and nations of Southeast Asia, more favorable conditions have been created for the occurrence of the nilaparvata lugens. Therefore occurrences of this insect have been frequent and numerous. Further exploration of the reasons for its rampancy will help to seek ways to eradicate the problem.

9296
CSO: 8111/0338

HERITABILITY OF ECONOMIC CHARACTERISTICS OF XIAN RICE ESTIMATED

Beijing ZHONGGUO NONGYE KEXUE [CHINESE AGRICULTURAL SCIENCE] in Chinese No 4, 1979 pp 45-49

[Article by Son Xuchu [1327 2485 0443] of the Agricultural Science Institute of the Liuan Prefecture of Anhui Province: "Measuring the Heritability of Major Economic Characteristics in Hybrid Offspring Generations of Xian Rice"]

[Text] The major economic characteristics of paddy rice are generally quantitative characteristics. They are controlled by many genes, and they are easily affected by environmental change. This increases the difficulty in correctly and effectively selecting hybrid offspring generations. In recent years, paddy rice breeders at home and in foreign countries have conducted measurements of the heritability of major economic characteristics in an attempt to eliminate the effects of environmental conditions from phenotypes. Selection according to heritability can increase predictability in breeding and raise effectiveness of selection. Heritability expresses the percentage of variation of genetic types among variations of the phenotype. It is an important reference in breeding. But more important in breeding are measurement and analysis of heritability of each generation of hybrid varieties. In this way, breeding work can be directed better toward improvement of the method of selecting varieties and raising the effectiveness of breeding. This article attempts to measure the heritability of the (F_2-F_5) hybrid offspring generations and to propose a suitable method of selection.

Material and Method

In 1972 and 1973, six hybrid combinations were selected and formed. They were:

Selected and combined in 1972: 7201 (Puzao No 2 x Italy B), 7203 (Jiunongzao No 1 x Erjiulu No 1), 7204 (Italy B x Liantangzao No 3), 7206 (Xiangaizao No 4 x Italy B), 7207 (Longge 33 x Erjiulu No 1);

Selected and formed in 1973: 7308 (IR8 x Erjiuqing).

From 1973 to 1977, F_1 to F_3 generations of the hybrids were planted in the early seasons. They were sown between April 7 and April 10, and transplanted between April 27 and May 5. All parents and offspring were singularly transplanted. Two hundred plants of the F_2 generation of 7308 were placed under observation but only 100 plants of the other combinations were placed under observation. Plant lines were established starting from the F_3 generation. Plants of the F_2 generation of each combination were classified into those plants having characteristics similar to their parents', those having characteristics of both parents or intermediate characteristics, and those having characteristics superior to their parents'. Fifteen to 20 such single plants were selected from each of these groups. In the F_3 generation, 15 to 20 plant lines were established. Forty plants of each plant line were placed under observation. Eight to 10 plant lines were selected from the F_3 generation. Eight to 10 plants were selected from each plant line and a line colony was established in the F_4 generation. Six lines were selected from among the F_4 plants. Representative plant lines and single plants were then selected from each of these lines and observation continued in the F_5 generation. Studies of 7207 and 7308 combinations were made down to the F_4 and F_5 generations and studies of other combinations were made only down to the F_3 generation. Twenty plants of each plant line and parents of each generation of F_4 and F_5 plants were placed under observation.

The heritability of major economic characteristics of F_2 plants was estimated by the general method. The formula is:

$$\text{General heritability } h^2(\%) = \frac{V_{Fn} - \tfrac{1}{2}(V_{P_1} + V_{P_2})}{V_{Fn}} \times 100$$

where V_{Fn} represents variation of the phenotype of the hybrid colony of the nth generation, V_{P_1} and V_{P_2} separately represent variations of the phenotypes of the female and the male. The estimated value of environmental change is the average of the two.

In the F_3, F_4 and F_5 generations, the correlation method was used to measure the heritability of nine characteristics and the method of variational analysis was used to measure the heritability of two characteristics. The formula for estimating heritability using the correlation method is:

$$h^2(\%) = W_1F_n \cdot F_{n+1} \sqrt{V_{Fn} \cdot V_{Fn+1}} \quad (n \quad 2)$$

where $W_1F_n \cdot F_{n+1}$ is the mutual variation of the average value of the F_n individuals and the F_{n+1} plant line (or average value of the line), VF_n and VF_{n+1} are respectively the variations of the values of the F_n single plants (or average value of the plant line) and average value of the F_{n+1} strain (or average value of the line).

The general heritability of the two characteristics of the number of days for heading and the plant height was estimated by the method of variational analysis. The estimation formula is:

$$\text{General heritability } h^2(\%) = \frac{\text{Hereditary variation}}{\text{Variation of the phenotype}}$$

$$\text{Hereditary variation} = \frac{\text{Variation among strains-variation within strains}}{\text{Number of repetitions}}$$

Result and Analysis

I. Estimation of the general heritability of the major economic charateristics of F_2

The heritability of four combinations estimated by the general method is listed in Table 1.

Table 1. Hereditary Variation, Environmental Variation and General Heritability of the F_2 Colony

1)	2)	3)	4)	5)	6)	7)	8)	9)	10)	11)
7201	12)	40.32	68.21				195.07	-17.46	4.18	1.53
	13)	4.57	10.04				407.24	194.62	0.57	29.06
	(%) 14)	89.8	86.1				32.5	-9.8	88.0	5.2
7204	12)	35.84	411.48		5.48	3.86				
	13)	5.12	14.12		0.77	6.38				
	(%) 14)	87.5	96.7		44.7	37.7				
7207	12)	84.06	80.28				355.86	15.49	2.66	-3.6
	13)	2.43	7.33				120.73	85.92	0.55	18.5
	(%) 14)	97.1	91.1				74.6	15.2	82.8	-19.4
7208	12)	66.57	49.6	3.41	4.01	0.73	635.79	166.51	10.12	23.71
	13)	2.37	6.75	0.93	13.8	9.84	191.65	55.74	1.01	34.20
	(%) 14)	96.5	88.0	78.8	22.5	6.91	76.9	74.7	90.93	40.9
15)	(%) 14)	92.7	90.5	78.8	33.6	22.3	61.3	30.0	87.24	15.4

Note: All negative valued heritability are substituted by zero in computing the average.

Key:

1) Combination
2) Variation and heritability
3) Number of days for heading
4) Plant height
5) Length of panicle
6) Highest number of tillers
7) Number of effective tillers
8) Total number of grains per panicle
9) Number of semi-filled grains per panicle
10) Thousand grain weight
11) Yield of seed grains of single plant
12) Hereditary variation
13) Environmental variation
14) Heritability
15) Average

It can be seen from Table 1 that the number of days for heading has the highest heritability with an average of above 90 percent. In particular, its heritability is even higher in the F_2 generation of such combinations as 7207 and 7308 in which the number of days for heading of the parents differs from that of the ecological type to a greater extent. The heritability is above 96 percent. Heritability of plant height is the second highest. The thousand grain weight, length of panicles and total number of grains per panicle have medium heritability, generally between 60 and 90 percent. Heritability of the total number of tillers and the number of effective tillers of the single plant is lower, generally between 20 and 40 percent. Heritability of the number of semifilled grains and the amount of yield of seed grains of the single plant differs to a greater extent according to different combinations, generally between 5 and 40 percent. A few combinations showed negative heritability values because of errors in sample selection.

II. Estimation of the general heritability and correlative heritability of major economic characteristics of F_3

The results of estimating the general heritability of two characteristics of F_3 using the method of variational analysis are shown in Table 2.

Table 2. Heritability of the F_3 Lines Estimated by the Method of Variational Analysis

1) 组合	2) 抽穗日数			3) 株高		
	4) 遗传变量	5) 环境变量	6) 遗传力 (%)	4) 遗传变量	5) 环境变量	6) 遗传力 (%)
7201	25.8	1.50	94.6	82.97	1.83	97.1
7203	42.69	2.83	93.8	74.8	3.15	95.9
7206	27.9	2.31	92.3	46.21	5.72	89.01
7204	45.03	4.53	91.0	635.56	7.18	98.9
7207	40.43	1.48	96.4	78.4	4.42	94.6
7308	95.18	6.28	93.8	43.26	5.86	88

Key:

1) Combination	4) Hereditary variation
2) Number of days for heading	5) Environmental variation
3) Plant height	6) Heritability (%)

Results of estimating the heritability of nine characteristics using the correlation method are shown in Table 3.

Comparison of Table 2 and Table 3 shows the heritability estimated by the method of variational analysis is higher than that estimated by the correlation method. This is because the method of variational analysis has the effect of eliminating dominance and mutual effects. Thus, it can more truthfully reflect the hereditary relationship between the parent and the offspring generations. Table 3 shows the specific heritability of nine

Table 3. Heritability Estimated by the Method of Correlation Between F_2 and F_3

1)	2)	3)	4)	5)	6)	7)	8)	9)	10)
7201	90.1**	93.9**			84.6**	59.6*	71.3**	-14.1	
7203	87.2**				71.7**	16.6	61.9*		
7204	90.0**	96.2**		9.7	71.9**	63.4*	71.1**		
7206	81.5**		58.5*	-14.6	70.7**	68.3**	64.1*	42.3	
7207	84.9**	87.8**			76.3**	28.1	70.9**	40.8	
7208	89.8**	82.5**	6.1	7.4	71.5**	40.9	71.2**	36.1	89.5**

* Dominant ** Extremely dominant

Key:

1) Combination
2) Number of days for heading
3) Plant height
4) Highest number of tillers
5) Number of effective tillers
6) Total number of grains per panicle
7) Number of semifilled grains per panicle
8) Thousand grain weight
9) Yield of seed grains of single plant
10) Length of panicles

characteristics of six combinations. It can be seen from the table that plant height and the number of days for heading have the highest heritability with a lowest of above 80 percent. The heritability of the total number of grains per panicle and the thousand grain weight is medium, varying within the range of 60 to 80 percent. The heritability of the four characteristics mentioned above do not show any wide range of change among the various combinations. Length of panicles was measured for only one combination and it showed a high heritability. The heritability of the three characteristics of the highest number of tillers of the single plant, the number of effective tillers of the single plant and the yield of seed grains of the single plant is generally very low, and a great range of change is shown among the various combinations. Some even show negative values. This indicates that these three characteristics are greatly affected by external conditions. The heritability of the number of semifilled grains per panicle is generally very low, but higher in the three combinations of 7201, 7204, 7206, showing an obvious relationship. These three combinations have a common parent, the "Italy B" variety. This indicates that the higher percentage of unfilled grains of the offspring of combinations of varieties of more distant kinship is inheritable.

Results of measuring dominance show the four characteristics of the number of days for heading, plant height, length of panicle and the number of grains per panicle displayed extreme dominance in six combinations.

Thousand grain weight displayed extreme dominance in four combinations and dominance in two combinations. This indicates that the inheritance of these five characteristics is strong and effective selection selection can begin from the second generation. The total number of tillers of the single plant showed dominance in 1 combination but not in all the other combinations. The yield of seed grains of the single plant and the number of effective tillers did not show any dominance in each of the combinations. Thus these three characteristics should not be selected in the second generation. All definitely sterile combinations found in the offspring generations of parents possessing greater genetic differences can be selected for fruiting characteristics in F_2, while selection of fruiting characteristics of ordinary combinations in the F_2 generation should not be done.

III. Estimation of general heritability and correlative heritability of major economic characteristics of F_4 and F_5

Results of estimating the general heritability of two characteristics of F_4 and F_5 by the method of variational analysis are shown in Table 4.

Table 4. Heritability of Colonies of the F_4 and F_5 Lines Estimated by the Method of Variational Analysis

1) [illegible]	[illegible]	2) [illegible]			3) [illegible]		
		4) [illegible]	5) [illegible]	6) [illegible] (%)	4) [illegible]	5) [illegible]	6) [illegible] (%)
7207	F_4	85.34	1.78	97.3	68.01	1.33	97.7
	F_5	25.72	0.52	98	78.89	2.06	97.3
7308	F_5	234.89	2.6	98.9	178.5	2.07	98.8

Key:

1) Combination	4) Hereditary variation
2) Number of days for heading	5) Environmental variation
3) Plant height	6) Heritability (%)

Results of measuring the heritability of nine characteristics using the correlation method are shown in Table 5.

Comparison of Table 4 and Table 5 shows that the heritability estimated by the method of variational analysis is higher than that estimated by the correlation method. Comparison of Table 4 and Table 5 with Table 2 and Table 3 shows that generally the heritability of such characteristics as the number of days for heading, plant height, total number of grains per panicle and the thousand grain weight increases correspondingly as the number of generations increases and tends to stabilize genetically.

Table 5. Heritability Estimated by the Method of Correlation Between F_3 and F_4, and Between F_4 and F_5

1)		2)	3)	4)	5)	6)	7)	8)	9)	10)
7207	F_4	85.9**	92.8**		67.6*	83**	41.2	83.4**	50.0	93.9**
	F_5	96.6**	93.1**		34.9	88.4**	35.6	88.4**	54.3*	88.5**
7384	F_5	88.9**	94.5**	40.3	2.8	74.8**	6.0	70.0*	24.2	89.9**

Key:

1) Combination
2) Number of days for heading
3) Plant height
4) Total number of tillers
5) Number of effective tillers
6) Total number of grains per panicle
7) Number of semifilled grains per panicle
8) Thousand grain weight
9) Yield of seed grains of a single plant
10) Length of panicle

Such characteristics as the number of effective tillers, yield of seed grains of the single plant and the number of semifilled grains do not manifest a definite pattern. Their heritability changes indefinitely between generations, suddenly high and suddenly low. This indicates these characteristics are easily affected by environmental conditions. The heritability of the length of panicles generally does not change too much after the F_3 generation. The heritability of the total number of tillers of the single plant was measured for only one combination but it also showed a corresponding increase as the numbers of generations increase.

Results of dominance measurements show the four characteristics of the number of days for heading, plant height, total number of grains per panicle and length of panicles display extreme dominance. Thousand grain weight also displays extreme dominance and dominance. The total number of tillers of the single plant and the number of semifilled grains per panicle both do not display dominance. The number of effective tillers in the F_4 generation of combination 7207 shows dominance but does not show any dominance in the F_5 generation. This indicates it is still a characteristic that does not stabilize easily. The yield of seed grains of single plants shows dominance in the F_5 generation of combination 7207. This indicates that although the yield of seed grains of plant lines of later generations is still limited by environmental conditions, it does manifest a certain degree of heritability.

Discussion

In the 1950's, paddy rice breeders at home and in foreign countries proposed several views regarding the correct and effective selection of hybrid offspring generations. Japan's Matsuo Korei (1956) concluded after studying the relationships among the major economic characteristics of paddy rice of different generations of hybrid offspring that heading time, resistance to disease, plant height and plant type are characteristics with stronger heritability in the early generations. These can be selected from the F_2 generation but the weight of panicles, the number of grains per panicle and the number of tillers are characteristics which show a weaker heritability in the early generations. These can be selected starting from F_4 or later generations. There are still other breeders who have proposed a method of collective selection. This means to select such characteristics as heading time and plant height in the early generations and then separate the selected plants into groups for selection of productive factors (number of panicles, number of grains and weight of grains) in later (after F_4) generations. They propose planting a massive number of hybrid colonies to avoid loss of superior material.

The two opinions above share a common basic view. Both believe the heritability of productive factors is weak in the early generations and it can be disregarded when selection is made and emphasis should be placed on these factors only in later generations. My personal experiments do not entirely support their views. A comparison of the heritability of each generation of the two combinations 7207 and 7308 here (Table 6) shows that heritability of some factors that determine the amount of yield is also very high in early generations.

Table 6 shows that in addition to the high heritability manifested by the number of days for heading, plant height and length of panicles in early generations among the productive factors, the total number of grains per panicle and the thousand grain weight also have a very high heritability in the F_2 and F_3 generations, generally above 70 percent. Only the total number of tillers of the single plant, the number of effective tillers and the number of semifilled grains per panicle and the yield of seed grains per single plant have a rather low heritability. Accordingly, this author believes that in the selective breeding of hybrid offspring generation of xian rice, genealogy should be the main method. This means that such characteristics as the time of heading, plant height, plant type, length of panicle and resistance to disease should be strictly selected in the second hybrid generation, and productive factors of the total number of grains per panicle and the thousand grain weight should also be selected in single plants, and plant lines should be established starting from the F_3 generation. In this way, the loss of superior material can be avoided and breeding can develop better toward a direction needed by man by beginning from the early generations and by the cultivation and directional selection of these characteristics. This is a means of actively controlling

Table 6. Heritability of Major Economic Characteristics of Each Generation (%)

1)		2)	3)	4)	5)	6)	7)	8)	9)	10)
7307	F	97.1	91.4			74.6	15.2	82.8		-19.4
	F	94.9	87.8			76.3	28.1	76.9		40.8
	F	95.9	92.6		67.5	89.0	41.2	83.4	93.9	50.0
	F	96.6	93.1		34.9	86.4	35.6	88.4	88.5	54.3
7308	F	96.5	88	22.5	6.91	76.9	74.7	90.9	78.8	40.9
	F	89.9	82.5	6.1	7.4	71.5	40.9	71.2	89.5	36.1
	F	95.9	94.5	40.3	2.8	74.8	6.0	70.0	69.9	24.2

Key:

1) Name of combination and generation
2) Number of days for heading
3) Plant height
4) Total number of tillers of single plant
5) Number of effective tillers of single plant
6) Total number of grains per panicle
7) Number of semifilled grains per panicle
8) Thousand grain weight
9) Length of panicle
10) Yield of seed grains of single plant

nature. Of course, such characteristics as the total number of tillers of the single plant, the number of effective tillers and the yield of seed grains which have a weak heritability in early generations can be disregarded until after the F_4 generation when they should be emphasized. The selection of the number of semifilled grains can be disregarded in early generations of combinations of parents more closely related, but selection of fruiting characteristics of offspring generations of combinations of parents with rather large genetic differences or more distant kinship should be watched beginning in the F_2 generation.

9296
CSO: 4007

NEW FARM MACHINES PRODUCED

Guangzhou NANFANG RIBAO in Chinese 12 Dec 79 p 2

[Article: "A Hydraulically Operated Tree Puller and a Grasscutter-Fertilizer Piler Have Been Successfully Constructed and Put Into Production"]

[Text] The mechanical research institute of Huanan Tropical Plant Institute has successfully trial-constructed a hydraulically operated tree puller and a small power grasscutter-fertilizer piler. These machines have been put into production.

The hydraulic tree puller is one of the attachment farm machines that can be used for the mechanization of rubber plantation operations. It is attached to and draws power from a Dongfanghong-60 tractor. It is capable of uprooting a rubber tree having a circumference at chest level of from 80 to 160 cm. It takes only about 3 to 5 minutes to uproot a tree. The amount of work that can be done by the hydraulic tree puller operated by a single worker over an 8-hour workday is equivalent to 40 man-days of work. Furthermore, it is capable of felling a tree in a designated direction, so that its operation is quite safe, and it is also capable of clearing more roots. The grasscutter-fertilizer piler is an attachment to the Gongnong-10 hand-operated tractor. It can cut a strip of grass 60 cm wide. The amount of work that can be done by this grasscutter over an 8-hour day is equivalent to 10-man days of work, and the cost would be only one-fourth that of manual labor. Research work culminating in the construction of these two farm machines was started in 1976. Successful construction of these two farm machines has contributed positively to speeding up the mechanization of rubber production.

9113
CSO: 4007

BRIEFS

CATTLE BREEDING CONFERENCE--Animal husbandry experts attending the national conference on cattle breeding in Nanyang called for developing beef cattle in order to change the diet of the Chinese people and modernize China's animal husbandry production. The experts reviewed problems in breeding beef cattle in the country and urged departments concerned to take effective measures in the following work: 1) do a good job in the production of forage grasses and fodders, 2) popularize frozen semen and artificial insemination so as to raise the utilization rate of fine-breed bulls, and 3) conscientiously implement economic policies relating to cattle raising. [Beijing XINHUA Domestic Service in Chinese 0250 GMT 20 Feb 80 OW]

SUGAR PRODUCTION--Beijing, 28 Feb--China is not self-supporting in sugar production, having to import large quantities of sugar from abroad. The unit cost of imported sugar has doubled this year, compared with the beginning of last year. To increase sugar production at home and raise the enthusiasm of peasants planting sugarcane and sugar beets, it is advisable for the departments concerned in sugar crop-producing areas to "trade grains for the peasants' sugar," which has proved quite effective in some areas. Before 1975, the annual sugar output in Fujian Province was approximately 110,000 dun. Following implementation of the policy of "trading a dun of grain for a dun of sugarcane," the annual sugar output is expected to rise to around 350,000 dun during the 1979-1980 period. [Beijing XINHUA Domestic Service in Chinese 0308 GMT 28 Feb 80 OW]

COMMUNE-RUN ENTERPRISES--In the course of economic readjustment, Jiangsu, Heilongjiang and Shaanxi provinces have scored new successes in developing commune- and brigade-run enterprises. Commune- and brigade-run enterprises in Jiangsu produced a total industrial output value of 7,359 million yuan last year, 17.6 percent more than that in 1978. There are 25 counties in which total industrial output value produced by commune- and brigade-run enterprises exceeded 100 million yuan. In Heilongjiang, the total industrial output value produced by commune- and brigade-run enterprises reached 1,377 million yuan, 21.8 percent more than the previous year. There are 46,500 commune- and brigade-run enterprises in Shaanxi province; they earned a total income of 800 million yuan, a 26-percent increase over the previous year. [Beijing Domestic Service in Mandarin 0400 GMT 7 Mar 80 OW]

DRINKING-WATER WELLS--In the past 4 years more than 3,100 wells providing drinking water for people and animals have been built in pastoral areas in Nei Monggol, Xinjiang, Qinghai, Gansu, Ningxia and Jilin. There are more than 1.1 million square kilometers of grassland in north China. These wells, in addition to other water sources developed in the past years, have solved the problem of water shortage for 4.8 million animals on 110,000 square kilometers of grassland in these provinces and autonomous regions. [Beijing Domestic Service in Mandarin 0400 GMT 10 Mar 80 OW]

RICE RESEARCH INSTITUTE--A 13-member joint investigation group of the International Paddy Rice Research Institute and the Chinese Academy of Agricultural Sciences led by Dr (Lei-jia), deputy director of the International Paddy Rice Research Institute, and (Bao Qingnong), director of the scientific research department under the Chinese Academy of Agricultural Sciences, conducted an investigation in Zhejiang Province from 5 to 11 March. The purpose of their visit to Zhejiang is to work out plans for establishing a modern paddy rice research institute in China with the assistance of the International Paddy Rice Institute and to select a proper location for building the institute either in Zhejiang, Guangdong or Hunan Province. On the evening of 6 March, Vice Governor Yang Fanglie gave a banquet in honor of the group. The joint investigation group left Hangzhou for Beijing today. [Hangzhou Zhejiang Provincial Service in Mandarin 0400 GMT 11 Mar 80 OW]

CSO: 4007

BRIEFS

AGRICULTURAL DRIVE SUPPORTED--Industrial and communications departments in Anhui are making their best efforts to support spring farming. Since the beginning of winter last year to 29 February this year, industrial departments in the province produced 790,000 tons of synthetic ammonia, nitrogenous and phosphate fertilizers, 25 million tons of pesticides, 6,700 large and small tractors and 174,000 handcarts for use in spring farming. Many agricultural machinery plants sent out technicians to the countryside to help communes and brigades keep their farm machinery in good condition. Communications departments also played a leading role in the current drive to support agricultural production. During last month, they shipped some 400,000 tons of farm equipment and material to the countryside. [OW071233 Hefei Anhui Provincial Service in Mandarin 1100 GMT 6 Mar 80 OW]

COTTON PRODUCTION GROUP--A provincial leading group for cotton production was established in Hefei on 8 March in order to strengthen leadership in this regard. Under the leadership of the provincial party committee and the provincial people's government, this leading group is composed of responsible comrades of the provincial Agricultural Commission, the provincial Finance Office, the provincial Planning Commission, the provincial Agriculture Department, the provincial supply and marketing cooperative, the provincial Food Department, the provincial Textile Bureau and the provincial Women's Federation. Meng Fulin is its head and (Chen Haibo), (Zhang Shirong) and (Shao Ming) are its deputy heads. [Excerpts] [OW152225 Hefei Anhui Provincial Service in Mandarin 1100 GMT 14 Mar 80 OW]

DONGZHI COUNTY SPRING FARMING--Supplies are being delivered to the fields in support of spring farming in Dongzhi County, Anhui Province. So far, 9,500 tons of chemical fertilizers, 560 tons of insecticides, 30 tons of plastic sheeting for nursery beds, 248 farm machines and tools, and 146,500 jin of fine early rice seed have been delivered. [Hefei Anhui Provincial Service in Mandarin 1100 GMT 29 Feb 80 OW]

REINFORCEMENT OF WATER FACILITIES--In view of the drought conditions in the county over the past few years, Huoqiu County, Anhui Province, is calling for reinforcements of its ponds and reservoirs to store more water for irrigation this year. The county's existing ponds and reservoirs have a total capacity of 140 million cubic meters. After reinforcements, the total capacity will be increased by more than 370 million cubic meters. [Hefei Anhui Provincial Service in Mandarin 1100 GMT 26 Feb 80 OW]

CSO: 4007

BRIEFS

GRAIN PRODUCTION--Fujian has further strengthened the building of commodity grain base counties and demanded that these counties strive for increased grain production in 1980. The province chose 12 counties as commodity grain bases in 1978. Altogether they produced 1,170 million jin of grain in 1979, an increase of 13.5 percent compared with 1978 accounting for 39 percent of the province's total procurement task. In 1979, grain procurement in Jianning County exceeded 50 million jin and it became a new commodity grain base. The province has also decided to assist the base counties by providing them with 20,000 to 30,000 tons of chemical fertilizers, and farm machinery, and granting loans to increase production and improve the living standard of peasants. [HK050450 Fuzhou Fujian Provincial Service in Mandarin 1035 GMT 28 Feb 80 HK]

AFFORESTATION WORK--Fuzhou, 4 Mar--All localities in Fujian Province have gone all-out to carry out spring afforestation. As of 25 February, this province had leveled 1.6 million mu of land for afforestation, afforested 1.27 million mu of land and planted 570,000 trees. As of the end of February, Jianyang Prefecture had afforested 450,000 mu of land. (Beijing XINHUA Domestic Service in Chinese 0134 GMT 4 Mar 80 OW]

CSO: 4007

GUANGDONG

NANHAI COUNTY LEADS IN MAKING NEW BREAKTHROUGH IN AGRICULTURE

Guangzhou NANFANG RIBAO in Chinese 20 Feb 80 pp 1, 3

[Article by Chen Mantian (7115 3353 1131) and Liang Fuqing (2733 4395 2348): "With Great Ambition and Exuberance Nanhai County Works Hard for a New Breakthrough in Agriculture: Use Down-to-Earth Struggle and Action to Greet the First Spring of the Eighties; Firmly Implement Policy, Do Scientific Farming Well, Go a Step Further Toward Full Granaries and Full Pocketbooks"]

[Text] Last year Nanhai County obtained all-round notable achievements in agriculture, industry and sideline production. With exuberance and great ambition the people throughout the county are striving for a new breakthrough this year and are taking another step toward "not only full granaries but also full pocketbooks."

It appears from the current spring plowing and preparations for plowing and sowing that Nanhai County has already begun to take that new step. [The amount of] of farmland in the county which has been deep-plowed this winter has increased more than 90,000 mu over that in the corresponding period in 1979. The county has already collected over 33 million dan of pond mud fertilizer which is over 6 million dan more than for the same period last year. A winter planting of 70,000 mu of Chinese milk vetch is a 25,000 mu increase over 1979. Due to funds drawn from commune and brigade-run enterprises, between 1 - 20 January the county bought over 200 truckloads of American red duckweed seedlings from outside the county. The county has struggle many times to plant this type fo red duckweed and [again] last year was unable to grow any. Because the production and supply of fertilizer within the county is done well chemical fertilizer (ammonium carbonate) already distributed to production teams at present has significantly increased over last year. The amount of fertilizer already stored for future use in the production teams is more than 50 jin per mu. In order to support the hog raising industry materially, 700,000 yuan has been withdrawn from local finances within the county as a subsidy to purchase feed concentrate. In addition to this, is the state policy of rewarding the sale of live hogs to the state with grain. Also, for each 100 jin of live hog procured by the state, 100 jin of feed concentrate can be purchased as a reward. These measures played an important role with regard to developing the hog raising industry and increasing fertilizer. The entire county has made every preparation to extend the superior variety

"Guizhao" to 185,000 mu of the early rice crop which will be an increase of nearly 130,000 mu over last year. Many basic level cadres have said: This type of initiative in preparations for plowing and sowing this year will enable us to have a better annual harvest if there is no major natural disaster.

While paying attention to the prerequisite of retaining public accumulation funds, last year commune members in Nanhai County had an average per capita collectively distributed income of 220 yuan. Now, having completed the latest verification, the average per capita income is 240 yuan, an increase of 54 yuan over 1978. The rural masses universally believe that the policy of the Third Plenary Session of the CCP Central Committee is the best policy which can allow the peasants to become rich as quickly as possible. Under this excellent situation, the county party committee led the cadres and masses to search for discrepancies. Everyone held that between communes and between production teams there are differences in per mu grain yields with yields exceeding 2000 jin or not even reaching the target set in the "National Program for Agricultural Development;" in the output of pond fish per mu there is a difference between more than 1000 jin and 2-300 jin. In the average per capita distribution of income, not only are there 79 production teams which have reached more than 400 yuan but there are also 45 production teams which are still below 100 yuan. Seeing the differences everyone felt [, however,] that production is moving quickly forward and there is a lot of potential so that throughout the county there appears a situation of everyone trying to overtake one another in friendly emulation.

In order to push agriculture forward this year, we, in Nanhai County, must first overcome the fear of change in people's thinking. After last year's big increase in income, Nanhai's peasants are partly happy and partly worried, happy that the party's policy is good but worried that the good life will not last long. There are even several cadres from brigades and production teams which became prosperous first who have said: "With our monthly income of more than 100 yuan which is even more than a county government official makes, how can county and commune leaders not be envious? How can urban people not be envious?" To counter this new ideological trend, a lively policy-type action was adopted in the county. This involved the secretary of the county party committee, Liang Guangta [2733 1684 1129], and other leading comrades of the county party committee going throughout the county to the several brigades which had an average per capita income of more than 400 yuan to "congratulate them on their prosperity." These several brigades, individually convened general membership meetings for the commune members in the evening when congratulatory letters from the county party committee were read out by leading comrades of the county party committee. These letters congratulated the cadres on leading the masses along the road of socialism to become rich through socialism. The leading comrades spoke of the honor of being prosperous and the ideology of being rich first and being honored first. At the general meeting brigade cadres called on the commune members this year to carry on the spirit of enduring hard and bitter struggles, to open up all roads to becoming prosperous and to work hard to become richer. They then had fireworks and showed a movie. The leading cadres of each commune also went to the production teams which had become prosperous first to "congratulate" them. This caused the peasants throughout the county to mutually announce and congratulate each other on their prosperity, to make merry and to overcome such thoughts as fearing to sip the nectar of prosperity. Now everyone is no longer afraid of a policy change.

In implementing the guiding principles and policy of agricultural development, Nanhai County resolutely moves toward "not only having full granaries, but also full pocketbooks." They have presevered in taking agriculture as the key and in integrating agriculture, industry and commerce. The grain producing area has been stabilized at last year's level in order to supply more commodity grain to the state. The income this year from commune and brigade-run enterprises throughout the county will strive to reach 300 million yuan, an increase of 50 million yuan over last year. The focal point for development rests with the brigades and production teams. The county party committee and concerned departments are in the process of supporting the communes and brigades' expansion of their management scope and their efforts to set up wineries and enterprises for processing agricultural by-products such as cassava, water chestnuts and vegetables. A group of new commune and brigade-run enterprises such as a cassava flour mill, a water chestnut flour mill, a bean products processing plant and a mooring rope plant from Guanyao [1351 4523], Xiaotang [1420 1048], Danzao [0030 3301] and Pingzhou [1627 3166] already have much of the preparation work underway. The grain department will be in the process of putting a grain processing plant with 18 workshops under brigade management.

In the area of promoting farming, animal raising and a diversified economy, Nanhai County is clearly pushing a policy of expanding exports and expanding supplies to neighboring cities. They are opening up the way for "everything," simultaneously developing pond fish, fruits and vegetables, silkworms, hogs, eggs, and traditional Chinese style paintings of birds, flowers, insects and fish as well as bonzai. Many communes are in the process of implementing [programs] for the artificial incubation of miscellaneous freshwater river fish and popularizing a rational, mixed raising of pond fish. For many years papaya--a plant seldom seen in Guangdong and Guangxi--has already been established within the county. This spring a large number will be planted; in fact, there are already 150,000 seedlings growing. Seventeen brigade-run chicken farms and state-managed mechanized chicken-raising farms which are to be built or are continuing to be built are now in progress of, respectively, selecting sites or under construction. Much of the commune and brigade-run industry in the county also produces export products. Last year the amount of money from export commodities throughout the county reached more than 150 million yuan placing the county first among the 2000-plus counties in the whole country. This year they will have to climb to new heights.

Nanhai County looks on the principle from each according to his ability, to each according to his work as a matter of prime importance. Last year Nanzhuang Commune universally put into practice a system of personal responsibility among the 1030 staff and workers of the commune-run enterprises. Any type of work in production which could be assessed according to the work done was assessed in this way. Those who exceeded the quotas were rewarded and the greater the excess in production, the larger the reward. The result was that in all the enterprises, there appeared the revolutionary scene of everyone concentrating all their attention on carrying out the four modernizations and seizing each minute and second to work. Throughout this commune, the commune-run enterprises which basically did not increase personnel had annual profits which increased from 600,000 yuan to more than 1.3 million yuan, more than doubling the profits. Similar examples are numerous throughout the county. This year all the commune and brigade-run enterprises will generally pursue this type of excellent experience.

During rice production [this year], every form of the system of personal responsibility will be further carried out and perfected. Last year some of the communes, according to party policy, contracted the work of such production items as several scattered economic crops, remote fish ponds, cattle, geese and duck raising to specialized groups and individual commune members. They rewarded excess production. The results generally achieved a very large margin of increase in production. Everywhere there were examples of output doubling and tripling. This year many communes are preparing to pursue this path. Every level of leadership in Nanhai County puts their main energy into developing the collective economy but at the same time boldly encourages and guides commune members in developing family side occupations, that is, family side occupations for commune members which are not only appropriate and increase income but also do not create an interference.

Every level of leadership in Nanhai County is paying even more attention to scientific farming than in former years. In order to build up soil fertility and scientifically apply fertilizer well, each commune has universally established a soil laboratory, added instruments, developed soil sampling tests and established soil records. During this year's rice production, they are emphasizing benefits and the avoidance of harm. Not only must they prevent spring cold, avoid the rains at the time of the Dragonboat Festival [date varies according to the lunar calendar, generally end of May or first part of June] and fully utilize the sunlight of June and July but also must not delay the late rice season so as to avoid the cold dew wind and cold damage. In order to raise the level of scientific farming, the county party committee leadership set the example of by attending technical classes. Almost every commune invited county and commune level technical personnel to give the cadres and masses classes. These classes have become larger and larger with each session lasting three to four hours. The attendees are very interested in the classes from beginning to end.

CSO: 4007

GUANGDONG

MECHANIZATION OF RUBBER PRODUCTION URGED

Guangzhou NANFANG RIBAO in Chinese 12 Dec 79 p 2

[Article: "This Is the Time To Speed Up Mechanization of Rubber Production"]

[Text] How should we speed up the mechanization of rubber production and the development of rubber production? The delegates who attended a symposium on natural rubber production, sponsored by the Ministry of Agriculture and Cultivation and held on Hainan Island, consider that the key to the solution of the problem lies in inclusion of mechanization into the agenda by the leading department of state farms, and in research, construction and popularization of various types of work machinery carried out by joint effort of the production and scientific research departments. At the same time, maintenance, repair and fitting of existing farm machinery must be done well.

Guangdong is the main base for the production of natural rubber in this country. Since liberation, the level of mechanization and semimechanization of rubber production in this province has been steadily rising with the growth of the rubber enterprise. At present there is a force of considerable size consisting of a group of technical personnel and a certain amount of mechanical equipment and power. The total area of land cultivated by mechanical production techniques has reached more than 319,000 mu, amounting to 27.7 percent of the area considered to be cultivable with machinery. Mechanical power has been adopted to carry out various operations during the rubber production cycle, including such operations as preparing the land and field for planting, caring for the plants, harvesting, processing, packaging, and transporting. However, the overall level of mechanization for rubber production at the state farms in this country today is still very low, thanks to the interference and destruction wrought by Lin Biao and the "gang of four." This state of affairs can be seen in the following: 1) the number of advanced combines that can be used at every stage of the production cycle is very small; 2) farm machinery consists more of power machinery and less of operational machinery, so that some of the labor-intensive work (such as milking rubber) still must be done by hand; 3) management and fitting of the farm machinery, technical training of the operators, and related scientific research work cannot catch up with the actual demand. In order to speed up the development of rubber production, we must conscientiously seek a solution to these problems and open a path for the mechanization of rubber production that is compatible with this country's circumstances.

Popularizing and fitting farm machinery are the two most urgent tasks that need to be accomplished right now. At present there is an average of 11.6 tractor horsepower for every 100 mu of state farms attached to the provincial farm bureau, and the average volume of cultivation work done by a standard tractor each year amounts to more than 3,900 standard mu of land. On the other hand, while the average tractor horsepower per 100 mu of cultivated land was only 10.7 horsepower in the United States, the work done per tractor was in excess of 10,000 mu. One of the important reasons why there exists such a huge gap is that, in this country, there is a mismatch between the tractor and the farm machinery--namely, a head (tractor) without a tail (farm machinery). The degree to which farm machinery is fitted indicates the level of mechanization and the efficiency of labor production. In the coming years we must put more emphasis on the development and construction of those farm machines which appear most capable of speeding up rubber production, capable of raising the labor efficiency, and capable of improving labor conditions. We must get organized in order to rush at the barriers. For example, milking the rubber is done manually today. It is a highly labor intensive work. If we could quickly come up with machinery which is capable of carrying out this operation, the workers could be freed from this backbreaking labor and work efficiency could be raised significantly. Furthermore, approximately 70 percent of the cultivated land of this province is in hilly and mountainous areas. In order to be able to realize mechanization of rubber production under these circumstances, we need more than anything else a significant breakthrough, because many existing farm machines are unfit for operation under these circumstances.

To realize mechanization of rubber production, we must strictly abide by the rule of doing what local circumstances dictate, starting from the basic concrete facts including the local natural conditions and the characteristics production. A simplistic approach will never succeed. For example, at Nanguang farm, located in the middle of the Leizhou Peninsula, where the terrain is flat, caring for the rubber plants has been found to be very labor intensive, requiring an excessive amount of labor. It has become one of the most outstanding production problems. Therefore, they have attempted first of all to mechanize the management and caring of the rubber plants. Zhongrei farm, which is located in the middle of the Murei Mountain slope, assigned priority to the construction of a road as a necessary prerequisite before any mechanization can be contemplated, because the terrain there is mountainous and the problem of transportation is most critical.

Starting from reality, unmindful of appearances, doing first what is most urgently in need of being done--this is the only way in which the limited resources of machinery and funds can bring the greatest economic return. In short, in order to realize the mechanization of rubber production in this province, we must first of all popularize those machines which are capable of freeing human labor from those stages which require the largest amount of work and are highly labor intensive, and in those areas where general purpose machinery can work well, including work related to reclaiming the land, planting, and transportation. Besides these points, we must pay attention to matching farm machinery and agricultural technology. The developing rubber business in this country encounters climatic conditions which are drastically different from those of Southeast Asian and Latin American countries. Therefore, mechanization of rubber production in this country must be combined with local conditions, including methods of cultivation, new strains of rubber plants, new fertilizers, herbicides, and pesticides.

While we strive to invent and construct new farm machinery for rubber production, we must not neglect the maintenance and care of existing machinery. According to calculations, if we could raise the "three rates" (the rate of machinery in working condition, the rate of machinery in operation, and the rate of work-hour utilization) of the farm machinery belonging to the state farm system by only 10 percent each, it would be equivalent to the work done by 300 additional tractors. It is evident from this example that the magnitude of the latent power of existing machinery and equipment that can be unleashed if maintenance and repair work are done well cannot be ignored.

To carry out the mechanization of rubber production well, we cannot overemphasize the importance of doing scientific research work well. Mechanization of rubber production is currently being attempted by every rubber-producing country in the world. Because there are still so many unknowns in matters related to this field of work, there is simply not too much machinery that can be imported. We must carry out research and trial construction by ourselves. Therefore, the role of scientific research appears more important than ever in this instance. Scientific research work related to farm machinery in this country at present is still extremely weak and backward in many respects. Some of the advanced modern technologies--such as electronic computers, solar energy, and lasers--are still beyond the reach of those who are attempting to mechanize rubber production. Furthermore, scientific research work is also scattered and lacks organization, often resulting in duplication and a waste of money as well as of material resources. These problems are all in need of a solution.

9113
CSO: 4007

Briefs

CHAOYANG COUNTY RICE PRODUCTION--The average per-mu yield of rice harvested by Chaoyang County, Guangdong, from its 540,000 mu of rice paddy field last year reached the mark of 1,698 jin, topping that achieved by all other counties of the province. This success is attributed to the county's efforts to improve the ecological conditions in the county area and carry out a large-scale farmland capital construction program. [Beijing XINHUA Domestic Service in Chinese 0115 GMT 2 Mar 80 OW]

FANYU COUNTY PRODUCTION--Guangzhou, 3 Mar--Fanyu County, Guangdong, achieved record unit and total yields of grain in 1979 from its 500,000 mu pattyrice fields. The average per mu yield reached more than 1,400 jin. Per-mu output of its 170,000 mu sugarcane fields also rose to more than 6 dun in 1979 from more than 5 dun in 1976, with total output reaching upwards of 1.05 million dun as compared to more than 910,000 dun in 1976. The 530,000-strong rural population contributed an average of 557 jin of commercial grain to the state, the second highest in Guangdong. Their average contribution of commercial sugar was 392 jin, which was the highest in the whole country. [Beijing XINHUA Domestic Service in Mandarin 0310 GMT 3 Mar 80 OW]

AGRICULTURAL PRODUCTION--By the end of January 1980, a large quantity of chemical fertilizers, plant chemicals, sprays, plastic sheets and medium- and small-sized farm tools had been prepared. This year, many communes and brigades have begun cultivating rice seedlings earlier than usual, demanding more plastic sheets. As a result, the Guangdong Agricultural Material Company has purchased 200 tons of plastic sheets and transported them to the countryside together with another 1,000 tons of plastic sheets already on hand. In January 1980, supply of plastic sheets for agricultural use increased by 50 percent over the corresponding period of 1979. The supply of sprays in January also increased by 5 times over the corresponding period of 1979. [HK050453 Guangzhou Guangdong Provincial Service in Mandarin 1130 GMT 27 Feb 80 HK]

CSO: 4007

BRIEFS

SPRING FARMING CONFERENCE--On 26 February, the Guangxi Regional People's Government held a telephone conference, calling on the people throughout the region to do a good job of spring farming and lay a foundation for reaping an all-round bumper harvest of agriculture. Xiao Han, secretary of the Guangxi Regional CCP Committee and vice chairman of the regional people's government, spoke at the conference. The participants revealed that the region had reaped a bumper harvest of agriculture in 1979. Both the grain rations and income of commune members had increased. At present, Guangxi's spring farming situation is good. Sowing of early corn in western Guangxi has now reached the busy season, while sowing of early rice in southeast Guangxi has also begun. However, because the winter sowing tasks were not fulfilled well enough, the tasks of reaping a bumper agricultural harvest this year will be very difficult. At present, "rain water" [19 February] has passed. Doing a good job in spring farming is of decisive significance in reaping a bumper agricultural harvest for the whole year. From mid-September 1979 to now, rainfall has been scarce in the region, with reservoir water storage greatly reduced. [HK061433 Nanning Guangxi Regional Service in Mandarin 1130 GMT 29 Feb 80 HK]

SPRING FARMING--Nanning, 8 Mar--A high tide in spring farming is being whipped up in the rural areas of Guangxi Zhuang Autonomous Region. As of the end of February, some 2.6 million mu of corn had been planted in Nanning, Liuzhou, Hechi and Bose prefectures. The autonomous region has also planted over 400,000 mu of economic crops, including sugar cane, peanuts and soybeans. Over 20 million jin of early rice seeds have been planted in Qinzhou Prefecture. Guangxi Autonomous Region has also improved 1.25 mu of low-yielding farmland since last winter. [OW091835 Beijing XINHUA Domestic Service in Chinese 0245 GMT 8 Mar 80 OW]

AFFORESTATION PROJECTS--According to incomplete statistics on 25 February, 735,000 mu of land have been prepared for planting trees throughout Guangxi, while 140,000 mu of trees have been planted. In 1980, the people in Xilin County plan to grow 15,000 mu of teaseed oil trees. [Nanning Guangxi Regional Service in Mandarin 1130 GMT 27 Feb 80 HK]

AFFORESTATION CIRCULAR--On 23 February the Guangxi Regional People's Government issued a circular on afforestation. The circular pointed out that during lumbering, it is necessary to consult with the communications departments. The reservoir management units are responsible for planting trees around the reservoirs and can also join the communes and brigades to plant them. It is necessary to develop and run the forestry farms of the communes and brigades. In the counties and communes where cedars grow, 15 jin of grain should be supplemented for every mu of cedar grown. The fruit trees planted around the commune members have always belonged to the commune members. The circular said that it is necessary to emphatically develop the woody and oil-bearing forests, strengthen protection of forests and strictly implement the forestry law. [Nanning Guangxi Regional Service in Mandarin 1130 GMT 27 Feb 80 HK]

CSO: 4007

LOW OUTPUT OF SMALL CHEMICAL FERTILIZER PLANTS REVEALED

Conferences, Discussions Held

Beijing BEIJING RIBAO in Chinese 10 Oct 79 p 1

[Article by Zhao Hong [6392 4767]: "Be Determined in Causing Small-scale Chemical Fertilizer Production to Catch Up to Advanced Levels"]

[Text] On 12 September, the [Beijing] Municipal Committee convened a roundtable discussion on small chemical fertilizer enterprises. They heard ideas and suggestions from the technical assistance unit of the "All-China Small Chemical Fertilizer Advanced Enterprise," i.e., the Jiaxing, Zhejiang Chemical Fertilizer Plant, and technical personnel from the Hainan, Guangdong and Wujin, Jiangsu Chemical Fertilizer Plants, on properly managing small-scale chemical fertilizer production in this municipality, and determinedly causing it to directly catch up to advanced levels.

This year at the end of May the Municipal Committee convened a conference on small-scale chemical fertilizer work at which it was decided to carry out a total rectification of eight small chemical fertilizer plants in the suburbs. After the conference, concerned county committees and the Beijing Municipality Chemical Industries Bureau jointly dispatched work teams to reside at the small chemical fertilizer enterprises and, together with the technicians and workers there, vigorously carry out the work of rectification. During the rectification work, each county routinely strengthened leadership of the small chemical fertilizer enterprises, and some even made changes in their leadership teams, replenishing technical strengths. Each small chemical fertilizer enterprise earnestly studied the experiences of Zhejiang and other provinces in strengthening enterprise management, strengthening management of coal, machinery and technology, and strengthening economic accounting. After more than 3 months of effort, small chemical fertilizer enterprises throughout the municipality showed monthly decreases in consumption of coal and electricity and in deficits, and, of the eight small fertilizer enterprises, those making up deficits and increasing surpluses increased from two to five. At first glance, the rectification work appeared to have been successful.

At this same time, concerned departments in the municipality invited technicians from the "All-China Small Chemical Fertilizer Producer Advanced Unit," the Jiaxing, Zhejiang Chemical Fertilizer Plant, and from the Hainan, Guangdong and Wujin, Jiangsu Fertilizer Plants to go to the chemical fertilizer plants in Pinggu County and Changping County. They were to provide assistance and leadership, and manage the small chemical fertilizer enterprise rectification work so that it could be an advancing factor. However, in comparing quotas set at the national level with those achieved in neighboring provinces and municipalities, the progress realized in small-scale chemical fertilizer production in this municipality was still not enough.

In the course of affirming the successes achieved by the chemical fertilizer plants at Pinggu and Changping, at the roundtable discussion the comrades from the Jiaxing Chemical Fertilizer Plant's Technical Assistance Unit and other sister organizations described the circumstances at the two plants. Through offering concrete ideas and suggestions to strengthen machinery management, promote the level of technology, keep careful labor records and control regulations, strengthen economic accounting, manage the coal-yard and other aspects, they brought about advancement in small-scale chemical fertilizer production and imbued the comrades at the discussion with inspiration.

The responsible comrade from the Municipal Committee spoke at the roundtable discussion, expressing thanks to the Jiaxing Chemical Fertilizer Plant and sister organizations for the support and assistance provided to this municipality. He pointed out furthermore that the concrete ideas and suggestions put forth by the Jiaxing Chemical Fertilizer Plant and sister organizations contained basic significance for all fertilizer plants in this municipality. These plants must solidly and unselfishly study advancement, and catch up with the advanced. At present the small chemical fertilizer enterprises of this municipality have undergone rectification and the successes gained are preliminary ones. Rectification of the ideological style of the technician and worker ranks must continue. The rate of operability of machinery as well as technological skills must be attended to and energy expended on training technical backbone cadres. Simultaneously, the economic policy of "distribution according to work" must be conscientiously fulfilled.

Reorganization Needed

Beijing BEIJING RIBAO in Chinese 10 Oct 79 p 1

[Commentary: "The Backward Look of Small-scale Chemical Fertilizer Production Must Be Thoroughly Changed"]

[Text] In only 3 months' time since the municipality reorganized small chemical fertilizer enterprises, some rather obvious changes have begun. Since one such plant was established in 1973 coal consumption had remained constant at over four tons, and it is now down to three tons. Now small chemical fertilizer enterprises which had experienced lengthy periods of losses have for the most part made up deficits and increased surpluses and their muddled management has also begun gradually changing. In point of fact, the situation of lagging production by small chemical fertilizer producers is certainly not irreversible; it can be changed.

We must soberly recognize that there is a considerable gap in the muncipality's small chemical fertilizer enterprises' production as compared with both national needs and production in sister provinces and municipalities and economic and technical quotas have fallen far behind those of the vast majority of sister provinces and municipalities. Through July of this year the municipality ranked only 24th in this area. This state of affairs does not reconcile with the four modernizations and absolutely must be reversed.

Raising a great hue and cry is no way to solve the problems of reorganizing small chemical fertilizer enterprises. Getting right down to the job at hand is what is required, and in particular the fundamentals of enterprise management must be firmly grasped. Once there is a good grasp of fundamental work, production can then make steady progress, and quotas will no longer be erratically under- or over-fulfilled.

The small chemical fertilizer enterprises must establish and strictly adhere to a system of personal responsibility from the leading cadre to the technical, managerial and worker personnel; all rules and regulations must be soundly established; technical training for staff and workers must be reinforced. Technical proficiency must be tested, workers' operational levels raised, and at the same time rigorous and detailed education must be conducted for the staff and workers so as to gradually form them into an ideologically red, work style firm, technically excellent backbone workforce. They must earnestly study the advanced experience of "three managements, one accounting" of the small chemical fertilizer plants of Zhejiang, and give increased attention to coalyard management. Some of this municipality's small chemical fertilizer enterprises have quite high quotas for coal consumption, some are even twice that of some of the more advanced municipalities and provinces. Coal consumption for some is just one fouled-up mess. They must vigorously reverse the fouled-up coal situation into one wherein "coal is considered as precious as gold and as cherished as food," so as to conserve even the minute grains. At the same time other resources such as electric power, petroleum, and water must be managed well. In this way consumption and expenses can be gradually decreased and the level of management work can gradually be raised. Economic policies must be realized and positiveness of the broad staff and workers must be fully aroused.

The municipality's small chemical fertilizer enterprises have made great progress in reorganizing although they are still a far cry from completely changing their backward ways. There is no reason whatsoever for them to be satisfied with the status quo and relax their efforts; quite the contrary, they must make great strides if they expect to get in stride with national progressive trends. The broad workers and staff members of the small chemical fertilizer enterprise battlefront, let us make persistent efforts, be steadfast in your determination and united in your purpose. Spare no efforts in order to catch up and bring about a thorough reversal in this municipality's small chemical fertilizer enterprise's backward production image.

9420
CSO: 4007

BRIEFS

RURAL TRADE FAIRS--At present, 90 percent of the trade fairs in Hebei have revived their traditional styles. There are now 90 trade fairs for selling agricultural and sideline products in nine municipalities. The goods now available in these fairs have increased from 70 to 80 kinds in 1978 to 180 at the end of 1979. The level of the prices in these fairs has been reduced by 15 percent over 1978. According to statistics, in 1979 the total amount of transactions from the trade fairs in the countryside throughout the province was 630 million yuan. This was an increase of 40 percent over 1978, and was equivalent to 7 percent of the total amount of retail sales in society. In 1979, the total amount of transactions from the rural goods trade fairs in the cities was 36 million yuan and was equivalent to 1.6 percent of the total amount of the retail sales in society. [HK010330 Shijiazhuang Hebei Provincial Service in Mandarin 0430 GMT 17 Feb 80 HK]

CSO: 4007

BRIEFS

IRRIGATED FARMLAND--In 1979, the total acreage of Heilongjiang's irrigated fields has reached more than 9 million mu. This shows an increase of 1 million mu as compared with the 1978 figure and establishes a new record of annual increase in the acreage of irrigated fields. [Harbin Heilongjiang Provincial Service in Mandarin 2200 GMT 28 Feb 80 OW]

AGRICULTURAL PRODUCTION--Zhaodong County, in Heilongjiang, has made great progress in agricultural production in the past 3 years. Compared with 1976, the county's total and per-mu grain output both increased by 80 percent in 1979, and the marketable grain the county sold to the state more than doubled. Acheng County, also in Heilongjiang, again surpassed the target of grain output set by the national program for agricultural development and sold 210 million jin of grain to the state in 1979, an increase of 10 percent over the previous year. [Harbin Heilongjiang Provincial Service in Mandarin 2200 GMT 26 Feb 80 OW]

CATTLE RAISING--Harbin, 6 Mar--Heilongjiang Province in 1979 sold 13,267 head of marketable cattle to the state, an increase of 11.6 percent over 1978. The bases for marketable cattle were built in 13 counties in 1978 with state investment, including Anda, Zhaodong, Zhaozhou, Zhaoyuan, Mingshui, Qinggang, Lanxi, Longjiang, Fuyu, Lindian, Gannan, Tailai and Dorbod Mongol Autonomous County. [Beijing XINHUA Domestic Service in Chinese 0200 GMT 6 Mar 80 OW]

AFFORESTATION CONFERENCE--The Heilongjiang Provincial People's Government recently held a conference in Harbin to discuss the zoning of barren hills and barren lands that are suitable for afforestation. Provincial CCP Committee Deputy Secretary Wang Luming and Provincial Vice Governor Wang Caoli attended and addressed the conference. This conference on the "two barrens" work called on all localities to implement the provincial CCP committee's decision to turn over to the management of the production brigades and forest farms some of such barren hills and lands for the purpose of afforestation. It noted that there are nearly 10,000 brigades in the mountainous or semimountainous cities and counties in Heilongjiang. If each is responsible for afforesting a 200-mu tract of barren hills or lands a year, in 5 years there will be an additional 10 million mu of forests, or one-third of the total area afforested by the province since the founding of new China. The conference warned against diverting such barren hills and lands for other purposes. [Harbin Heilongjiang Provincial Service in Mandarin 1100 GMT 27 Feb 80 OW]

CSO: 4007

HENAN

BRIEFS

LUSHI COUNTY AFFORESTATION--Zhengzhou, 4 Mar--Lushi County of Henan Province afforested 71,000 mu of land between the beginning of last winter and the end of January this year. [Beijing XINHUA Domestic Service in Chinese 0129 GMT 4 Mar 80 OW]

DANCHENG COUNTY GRAIN OUTPUT--Zhengzhou, 2 Mar--Dancheng County of Henan Province has provided 100 million jin of marketable grain to the state for 5 consecutive years since 1975. The total grain output of this county reached 636 million jin in 1978, or an increase of more than 80 million jin over that of 1974. Despite natural disasters, this county provided 100.1 million jin of marketable grain to the state in 1979. [Beijing XINHUA Domestic Service in Chinese 0153 GMT 2 Mar 80 OW]

XINXIANG COUNTY COTTON SEEDS--Zhengzhou, 9 Mar--Henan's Xinxiang County has provided more than 3 million jin of the "86-1" disease-resistant cotton seeds to more than 10 provinces, including Hebei, Jiangsu, Shandong and Sichuan. The high-yield, disease-resistant and high-quality cotton seeds were first cultured in 1972 by a brigade scientific and technological group in the county in cooperation with the Plant Protection Institute under the Chinese Academy of Agricultural Sciences. In the recent few years the fine seed has been sown to a total area of more than 200,000 mu in the cotton-producing areas of 12 provinces. [Beijing XINHUA Domestic Service in Chinese 0721 GMT 9 Mar 80 OW]

CSO: 4007

BRIEFS

SPRING FARMING--Hubei rural CCP organizations at all levels are doing well in preparations for spring farming. Certain aspects have been better grasped this year: 1) Water storage has increased. The province's current total water storage is 7.83 billion cubic meters, an increase of 3.4 billion cubic meters compared with the same time last year; 2) The amount of chemical fertilizer supplied this year has increased by 57,000 tons compared with the corresponding period last year; 3) The supply of farm chemicals and machinery is abundant; 4) Supply of electricity is guaranteed; 5) Spare parts for farm machines are in abundant supply and maintenance is guaranteed; 6) Deep-plowing and seed distribution are being well done. [Wuhan Hubei Provincial Service in Mandarin 1100 GMT 28 Feb 80 HK]

CSO: 4007

BRIEFS

COTTON PRODUCTION--The Hunan Provincial CCP Committee recently made readjustments to the planning of cotton production this year in order to increase cotton production throughout the province. In the past few years, the general area of cotton cultivation has been around 2.5 million mu. Practice over many years has shown that cotton production in concentrated cultivation areas is better than in scattered areas. Due to unfavorable conditions in the hilly regions, the people there have demanded to switch from cotton to grain and other industrial crops. Responsible comrades of the Hunan Provincial CCP Committee studied the actual conditions and formulated readjustment of cotton cultivation. Six prefectures and municipalities will reduce their area of cotton cultivation by 315,000 mu, and Changde and Yueyang prefectures will increase their area of cotton cultivation by 340,000 mu. The Hunan Provincial CCP Committee has also studied problems regarding grain procurement and rations in cotton cultivation areas. [HK090836 Changsha Hunan Provincial Service in Mandarin 1100 GMT 4 Mar 80 HK]

STATE FARMS--The 12 large state farms in Hunan have made use of their profits and funds on farmland capital construction, animal husbandry, industry and sideline production, the purchase of farm machinery and repair and construction of highways and factory buildings. In 1978, these farms turned losses into profits, earning a profit of 4 million yuan; in 1979, they earned a profit of 10 million yuan. According to statistics, these farms over the past 2 years have transformed four paper works producing 5 tons of paper a day while building two others of the same capacity. In 1980, these farms plan to increase the output of paper to 20,000 tons from the 9,200 tons of 1979 and spend 2.55 million yuan to purchase farm machinery. [HK061433 Changsha Hunan Provincial Service in Mandarin 1100 GMT 28 Feb 80 HK]

CSO: 4007

BRIEFS

AFFORESTATION CONFERENCE--The Jiangsu Provincial People's Government held a province-wide telephone conference on 6 March on afforestation work. Governor Hui Yuyu and Vice Governor Chen Ketian attended and spoke at the conference, calling on people in the province to mobilize immediately and launch an upsurge in afforestation work. They also stressed the implementation of the forest law and the party's policy on forestry work. [OW082216 Nanjing Jiangsu Provincial Service in Mandarin 2300 GMT 7 Mar 80 OW]

AQUATIC CONFERENCE--The Jiangsu provincial work conference on aquatic production took place in Nanjing from 29 February to 5 March. Over 290 representatives were present. Comrade Chen Ketian, vice governor of the provincial people's government, attended and spoke at the conference. The conference reviewed the work on aquatic production in the past year, summed up experience and studied the communique of the 5th plenary session of the 11th CCP Central Committee. Representatives of nine units spoke at the conference on the experiences in strengthening party leadership over fisheries, implementing the relevant policies, arousing the masses of commune members to develop fisheries and improving fishing skills. The participants also discussed 1980 tasks and were determined to raise the 1980 total output to 385,000 dun and, if possible, to 400,000 dun to usher in the opening of the 12th CCP National Congress. [Nanjing Jiangsu Provincial Service in Mandarin 1100 GMT 5 Mar 80 OW]

CSO: 4007

BRIEFS

FOREST PROTECTION CIRCULAR--The Jilin Provincial Revolutionary Committee issued a circular recently regarding forest fire prevention in 1980. The circular set forth three specific demands: 1) Governments at all levels must regard the protection of forests from fire as a matter of primary importance and attend to it unflinchingly. Efforts should be made to enforce the forestry act to prevent all acts that may damage forests. 2) It is necessary to rigidly enforce the rules laid down by the Jilin provincial authorities against all activities in open fields and forestry areas that involve the use of fire. 3) Governments at all levels should provide moral encouragement and material reward to those individuals and collectives that cherish forestry and score remarkable achievements and take legal actions against offenders who damage forests. [SK050518 Changchun Jilin Provincial Service in Mandarin 1100 GMT 26 Feb 80 SK]

CSO: 4007

LIAONING

RICE CROP NEAR ANSHAN STEEL CENTER POLLUTED

Beijing RENMIN RIBAO in Chinese 11 Jan 80 p 4

[Article by Lu Binzhan [4151 4426 0594] of the Anshan Municipal Grain Bureau, Liaoning Province: "Quickly Find Measures To Solve the Grain Field Pollution Problem!"]

[Text] A larger portion of the rice paddies of the Songsantiaizi Commune in the suburbs of Anshan and the rice grown from them have been seriously polluted because they used the waste water from the Angang and the Anshan Chemical Plants to irrigate their fields. Before the Spring Festival of 1978, the residents who receive their supply from Wangjia grain station, attached to Qianshan Food Management Office, unanimously realized that their rice tasted strange and that they became sick after eating it. The food department was obliged to exchange the bad rice with good. The Anshan Municipal Food Bureau and the Public Health and Disease Prevention Station on 7 April sent a sample of the rice to the Provincial Chemical Engineering Research Institute for an inspection. The results of the investigation conformed that the rice did taste strange and caused vomiting after eating, and a number of substances harmful to the human body were detected. The rice was declared unfit for human consumption.

This finding shook up quite a few people. There are 2.86 million jin of polluted grain rice and 2.27 million jin of polluted finished rice. How are we going to treat them? [illegible] happens to the rations for the commune members who live in the poll[illegible]rea? What is going to happen to the fields of Songsantaizi area?.. [illegible]e leaders at the provincial and municipal levels held that "all the grains should be sealed off temporarily and prohibited from human consumption," that all grains should be sold as industrial raw material at the price of miscellaneous grains," and that "the loss should be compensated by the polluting unit." According to a preliminary estimate, the loss of grain itself amounts to 458,710 yuan. Other losses, including management costs and interest on loans, would add up to 40,865 yuan by the end of the year, making a total loss of 499,575 yuan. According to the views held by the concerned leadership, this loss ought to be compensated by the Angang and the Snshan Chemical Plants. No matter who pays this bill, as the saying goes, wool grows on the sheep, and it is the state that is the true loser.

However, the root of the problems has never been solved. The farmers toiled another year and the land yielded a new grain crop. The loss in 1979 was no less than that in 1978. With an increase in the new loss, the contradiction between agriculture and industry became even worse. When grain procurement started and one of the production brigades of Songsantaizi Commune delivered its public grain in a trailer, the first municipal grain processing plant refused to accept the grain. The driver of the trailer could do nothing but park his trailer in front of the municipal party committee office. The municipal party committee member at last issued an order that the "grain be accepted, but stored separately from other grain...". Thus, several million jin of polluted grain entered the warehouse, wasting warehouse space, capital, and manual labor. Some old workers spoke with a heavy heart: "The food bureau got hold of this porcupine and has been unable to shake it off or put it down." At the same time, rumors filled the air and brought bad effects. Throughout the city, there are people who exchange rice. But is all of this rice polluted? Nobody has investigated.

We suggest that the leaders at the provincial and municipal levels and the responsible persons of the concerned units get together and hammer out workable measures and be responsible to the people as well to the state. They must not only refrain from eating this rice themselves, but also prevent other people from eating it. If the polluted rice is to be turned into industrial raw material, then let's take positive action. If Anshan itself cannot handle it all, let's ask for help from within the province, or even from other provinces. One thing we should not do is keep this grain stocked up in the warehouse. The polluted land in the Songsantaizi area can be convertdd to growing cash crops such as hemp in order to guarantee the commune members' income and assure their livelihood. The chemical plants must be given a specific date by which they must finish cleaning up their waste water.

9113
CSO: 4007

BRIEFS

LAMB PRODUCTION--As of 7 February, some 1.07 million head of lambs had been produced in Nei Monggol Autonomous Region. The survival rate of newborn lambs was as high as 93.6 percent. [Hohhot Nei Monggol Regional Service in Mandarin 1100 GMT 18 Feb 80 SK]

CSO: 4007

BRIEFS

BARLEY SHORTAGE--Xining, 26 Feb--A letter from a XINHUA reporter suggests that herdsmen of Tibetan and other minority nationalities in Qinghai Province should be supplied with more naked barley, a major component of their principal food. Naked barley accounted for only 17 percent of grain rations supplied to herdsmen in 1978 and 10 percent in 1979. Naked barley-growing areas were reduced from some 2.2 million mu in 1966 to 1.58 million mu in 1979, and the total amount of naked barley procured by the provincial food department dropped from nearly 60 million jin in 1966 to 16 million jin in 1979. Thus, Qinghai herdsmen were supplied with less and less naked barley. To satisfy the special needs of herdsmen of minority nationalities in Qinghai, distribution of crops should be readjusted so as to increase the production of naked barley. [OW271407 Beijing XINHUA Domestic Service in Chinese 0720 GMT 26 Feb 80 OW]

CSO: 4007

BRIEFS

CHEMICAL FERTILIZER PRODUCTION--By the end of 1979 the material production departments at all levels in Shaanxi delivered 209,000 tons of chemical fertilizer to the first line of production. Last winter, these departments made proper arrangements for the supply of chemical fertilizer. Recently, the Shaanxi Material Production Company transferred 2,880 tons of chemical fertilizer from places outside the province and purchased 11,000 tons of nitrogenous fertilizer from chemical fertilizer works throughout the province. [HK010438 Xian Shaanxi Provincial Service in Mandarin 1100 GMT 13 Feb 80 HK]

CSO: 4007

BRIEFS

AFFORESTATION MEETING--A provincial afforestation meeting was recently held in Jinan, Shandong. At the meeting this year's afforestation plan was formulated. Among other things, the plan calls for 1.45 million trees to be planted in the urban areas this year. [SK110416 Jinan Shandong Provincial Service in Mandarin 2300 GMT 3 Mar 80 SK]

JUANCHENG COUNTY TIMBER PRODUCTION--Jinan, 7 Mar--Juancheng County of Shandong Province has developed forestry production with good results. This county now has over 40 million trees with timber storage volume reaching 428,000 cubic meters. In 1979, this county earned some 14 million yuan from processing timber, accounting for 36 percent of income from diversified economy. [Beijing XINHUA Domestic Service in Chinese 0208 GMT 7 Mar 80 OW]

SUBURBAN COMMUNE PRODUCES RECORD NUMBER OF EGGS

Shanghai JIEFANG RIBAO in Chinese 21 Dec 79 p 1

[Text] Members of Xinjing commune in Shanghai County have been praised for supplying urban markets with adequate nonstaple foods. As of 19 December, Xinjing commune, with a population of 20,000, provided urban markets with 5 million jin of fresh eggs, thus deserving to be called the most distinguished egg supplier in Shanghai for [illegible] consecutive years and a prominent collective throughout the country. This year, each of its members sold the state 242 jin of fresh eggs, over 180 jin of pork, 19 fowl, and over 5,800 jin of vegetables.

Before the Great Cultural Revolution, Xinjing commune was already a renowned collective for supplying urban markets with large quantities of nonstaple foods. During the Cultural Revolution, it was criticized, under the influence of the ultraleft line promoted by Lin Biao and the "gang of four," for sparing no effort to "serve the cities." After the downfall of the "gang of four," its cadres and members, encouraged by the party's decision to implement its policy toward the countryside, have continued to promote the production of nonstaple foods as a contribution to the four modernizations. In addition to actively promoting the production of vegetables and pork, they have spared no effort to increase the output of eggs needed by urban dwellers. To solve the shortage of feed, they have imported silkworm cakes, peanut cakes, and fish powder from other parts of the country. To expand their poultry farms, they have relied on their own efforts to build 28 new ones for ducks and chickens. Thanks to its poultry tenders' efforts, in 1977 the commune increased its output of eggs to 980,000 jin--100 percent over the 1976 figure. In 1978, it more than doubled this output, to 2.42 million jin. This year, its output of eggs was 5 million jin, more than doubling 1978's output. Of the 5 million jin of eggs, 500,000 jin were laid by ducks, almost 10 times the amount in 1978. The decision to increase the output of eggs laid by ducks was made in response to the growing demands of urban dwellers.

This year, the income from the production of hogs, poultry, and eggs accounted for 38 percent of Xinjing commune's gross earnings. This marked the first time that its income from sideline production had exceeded its income from the production of grains and vegetables. This success was attributed to the fact that 15 percent of the commune's labor force was assigned to carry out sideline production in 1979.

9574
CSO: 4007

SHANGHAI

BRIEFS

TREE SEEDS IN PRODUCTION--Shanghai, 12 Mar--Seedlings of 10 types of trees have been successfully bred in test tubes here. The achievement is considered a significant advance in plant tissue culture. The 10 varieties are the olive, Chinese larch, Chinese fir, paulownia, two species of eucalyptus, azalea, purple poplar, bitter sweet and shrubby yew. It is believed that only the Chinese larch has been successfully bred in a test tube before. The seedlings were bred in 50 to 100 milliliter Erlenmeyer flask test tubes at a constant temperature of 25 degrees centigrade. The tallest seedling, a Chinese larch, is 10 millimeters, and the smallest, an eucalyptus, is 3 millimeters. A total of 300 seedlings of six varieties have been transplanted into soil for further observation and research, and all are growing well. The experiments were carried out jointly by three research workers in the Shanghai Research Institute of Parks and Woods and three teachers at Fudan University. The work began in 1978. [Text] [Beijing XINHUA in English 0821 GMT 12 Mar 80 OW]

AGRICULTURAL EXPERTS MEET--On 18 December, secretaries of party committees of 10 counties on the outskirts of Shanghai and leading members of their planning committees and of agricultural, farming, and farm mechanization bureaus went to the Hall of Science to meet with over 200 agricultural experts gathering there for a forum on exchanging technical experiences in modernizing agriculture. During the meeting, eight experts expressed their scientific views on farming methods, farm mechanization, pest control, soil surveys, application of photoelectric energy, balance of nature, tree planting, and fresh water fish cultivation on the outskirts of Shanghai. Chen Zonglie [7115 1350 3525], vice chairman of the Shanghai Municipal Revolutionary Committee and director of the Shanghai Municipal Agricultural Office, thanked the experts for contributing their wisdom to the modernization of agriculture. He also earnestly urged them to submit a proposal to him for the modernization of agriculture on the outskirts of Shanghai as a scientific basis for developing a similar plan for the future. [Text] [Shanghai JIEFANG RIBAO in Chinese 21 Dec 79 p 1] 9574

AGRICULTURAL MEETING--The Shanghai agroscience conference, the first such conference held in the past 30 years, opened on 5 March. It was attended by leading comrades of the municipal CCP committee and municipal people's government, responsible persons of the various municipal commissions and offices and local agroscientific experts, scholars, cadres and workers. It was presided over by (Wan Dingliang), vice chairman of the municipal agriculture commission. Comrade Chen Zonglie, a vice mayor and chairman of the commission, delivered a report entitled "Vigorously Strengthen Agricultural Science and Technology and Strive to Expedite the Realization of Agricultural Modernization in the Suburbs." [Shanghai City Service in Mandarin 1130 GMT 5 Mar 80 OW]

CSO: 4007

SHANXI CONDUCTS GENERAL SURVEY OF AGRICULTURAL, CLIMATIC RESOURCES

Beijing RENMIN RIBAO in Chinese 19 Jan 86 p 2

[Article: "Shanxi Conducts General Survey of Agricultural and Climatic Resources to Provide Cilmatic Basis for Implementation of Agricultural Division"]

[Text] According to a report that appeared in SHANXI RIBAO, Shanxi Province is positively carrying out a general survey of agricultural and climatic resources in order to implement agricultural divisions according to climatic conditions. They have basically completed work in the five major basins and in 109 counties and cities in the mountainous areas in the east and west. The work completed include fixed-point synchronous observations and surface investigations and visits.

This work has been carried out, in conformity with a unified technical standard drafted by the Shanxi Weather Bureau, by the agricultural and climatic resources general survey teams consisting of experts and concerned masses, with the county as the basic unit. The general survey is aimed at various problems related to local agricultural production. They have investigated spatial as well as temporal distribution of the pertinent meteorological elements, including light energy, thermal energy, precipitation, and other factors over various types of terrains and environments. They have investigated the climatic conditions that are beneficial as well as those which are harmful to staple crops, forestry, and animal husbandry. They have also looked into the laws of nature which govern the spatial and temporal distribution of the most damaging conditions--such as drought, hailstones, frost and ice--and into various preventive measures against these disasters. At the same time, they have summarized the meteorological data recorded over the past 20 years by the weather stations scattered all over the province, together with the data gathered from synchronous observation carried out by the more than 700 sentry points of the general survey teams, and have compiled and drafted the first draft of the Shanxi Province Agricultural and Climatic Resources Division. This survey has produced a valuable climatic basis for the implementation of rational agricultural division, so that beneficial climatic conditions may be fully utilized while disadvantageous climatic conditions may be avoided or prevented.

9113
CSO: 4007

BRIEFS

RURAL GRAIN, OIL RATIONS--In 1979 the total output of grain throughout Shanxi increased by 8 percent over 1978, while the output of edible oil increased by 45.4 percent. With the bumper harvest of grain and edible oil, the peasants' grain ration and amount of edible oil have also been prominently increased. The average grain ration distributed from the collectives for each farming person throughout the province increased by 20 jin over 1978. The average grain ration for each person in Jinzhong Prefecture was 570 jin. [HK010330 Taiyuan Shanxi Provincial Service in Mandarin 2300 GMT 18 Feb 80 HK]

ZUOYU COUNTY AFFORESTATION--Taiyuan, 4 Mar--Zuoyu County of Shanxi Province has persistently carried out afforestation since 1956. As of 1979, this county had afforested 862,000 mu of land, accounting for approximately 28.5 percent of the county's total area. This county is capable of producing 1,500 cubic meters of timber every year. [Beijing XINHUA Domestic Service in Chinese 0213 GMT 4 Mar 80 OW]

CSO: 4007

MONTHLY CASH DISTRIBUTION STARTED IN SICHUAN PRODUCTION BRIGADE

Beijing RENMIN RIBAO in Chinese 7 Jan 80 p 2

[Article: "Opening Wide the Road of Production and Developing the Collective Economy, Members of Xiashitang Brigade Receive Monthly Cash Distribution"]

[Text] On the day before New Year's Day, the headquarters of Xiashitang Brigade of Yijie Commune in Yibin County of Sichuan Province was filled with laughter and shouts of joy. Some of the commune members were signing their names and affixing their seals, while others were counting their Renmin Bi [paper currency]. This was the ninth time the commune members had received a monthly cash distribution this year, and that was the joyous sight on the occasion.

The Xiashitang Brigade began a monthly cash distribution in April last year. The specific method adopted by them is as follows. The work points earned by each commune member during a given month is converted into cash at the rate of 2.4 yuan per workday. After deducting the cost of rations and vegetables distributed, cash is distributed. The account is settled at the end of each year.

Now that the practice has been in effect for 9 months, cadres as well as the commune members are all delighted. First of all, it is beneficial to the livelihood of the masses. Many are able to develop a family sideline business. It has eliminated many cumbersome procedures of the past, such as one involving the withdrawal of cash. Whenever a commune member was in need of cash, he used to submit a request slip, which was approved by the cadre, and the cashier would dispense cash in exchange for the slip. Secondly, in the past the account was settled only once--at the end of the year. Since the commune members did not handle cash regularly, they were ignorant of income and expenditures. Now that they are paid monthly, they are more aware of the balance, which is beneficial to the expansion of economic democracy and to the maintenance of the high attendance rate at work. Thirdly, money in the hands of the commune members will in time find its way to the market and thus accelerate its circulation. This is beneficial to the state as well as to the collective.

The reason why Xiashitang Brigade is able to distribute cash monthly lies in the fact that the brigade has a certain amount of material foundation as a guarantee built by its own economic growth. In 1963, Xiashitang Brigade had suffered the blow of natural disasters for three years in a row, together with an attack of "communist wind," and its average grain yield per mu was no more than 500 jin, the average ration per person was only 317 jin, and a day's wage was only 0.29 yuan. The collective was so poor that it had to borrow in order to buy rope for the oxen. Over the past 20 years or so, they worked diligently along the road of combined agriculture, sidelines, and industry. Their production grew year after year, the commune members' lives improved likewise, and their contribution to the nation also increased proportionately. Last year, their total combined agricultural, sideline, and industrial production was valued at more than 480,000 yuan, which was 110,000 yuan more than that of the year before. Their average grain yield per mu was 2,325 jin, and the collective per capita hog production was 0.84. When the account was settled at the year's end, average per capita income was 221 yuan, which was 17 percent more than in the preceding year. The "most advanced family" of Luo Shichao, a family of three, received 2,210 jin of grain and 1,399 yuan in a family of five with only one female worker, Li Jiaying, received more than 200 yuan after deductions.

The development of agriculture, sidelines, and industry brought Xiashitang Brigade a sizable cushion to fall back on. Today, the entire brigade is in possession not only of more than 640,000 yuan in fixed capital and over 120,000 jin of grain in the warehouse, but also of more than 30,000 yuan in liquid assets.

9113
CSO: 4007

SICHUAN

BRIEFS

FOREST FIRE CIRCULAR--Recently, Sichuan People's Government issued a circular on strengthening prevention of forest fires. The circular said: It is necessary to prevent forest fires in order to protect raw materials. 1) It is mecessary to grasp preventing forest fires as an important task; 2) It is necessary to establish forest [words indistinct]; 4) It is necessary to launch emulation in preventing forest fires in hilly regions; 5) It is necessary to actively put out forest fires; 6) It is necessary to forbid disorderly felling of trees and stealing of wood; 7) Protection and prevention of forest fires must be done in close connection with the economic interests of the masses. [Chengdu Sichuan Provincial Service in Mandarin 2310 GMT 14 Feb 80 HK]

WENJIANG COUNTY WATER CONDITION--Chengdu, 9 Mar--Wenjiang County, which is in an area of Sichuan where snail fever is widespread and also has a high rate of hookworm disease, has in the past 2 years achieved significant results in improving its drinking water quality. All of the county's more than 4,200 old wells have been renovated and another 3,400 new ones sunk. The old wells were seriously polluted by insecticides, chemical fertilizers and industrial wastes. [Beijing XINHUA Domestic Service in Chinese 0718 GMT 9 Mar 80 OW]

CSO: 4007

BRIEFS

TRAINING CLASS--Some 80 cadres at the municipal and county levels, who are in charge of agricultural work, and responsible persons of agroscientific research units from Shanghai, Jiangsu and Zhejiang arrived at the Zhejiang Agriculture College on 5 March to attend the second cadres training class, sponsored by the Ministry of Agriculture. The class will last 4 1/2 months and [they] will study agricultural knowledge and skills. The opening ceremony was attended by (Qian Xin), deputy director of the ministry's Education Bureau, and Xue Ju, deputy secretary of the Zhejiang Provincial CCP Committee. [Hangzhou Zhejiang Provincial Service in Mandarin 0400 GMT 6 Mar 80 OW]

CASTOR OIL PRODUCTION--The Zhejiang Provincial Agriculture Bureau, Food Bureau, Education Bureau, CYL Committee and Supply and Marketing Federation recently issued a joint circular calling on people throughout the province to grow more caster-oil plants. The provincial CYL committee has set the period from 9 March to 15 March as the "castor-oil plant planting week" and urged youngsters in Zhejiang to strive to reap 3 million jin of castor-oil plant seeds in 1980. Earlier, the CYL Central Committee called on youngsters in China to grow castor-oil plants and set 100 million jin of castor-oil plant seeds as 1980 production target. [Hangzhou Zhejiang Provincial Service in Mandarin 1100 GMT 7 Mar 80 OW]

ZHEJIANG FISHING--Beijing, March 7--Some 285,000 tons of hairtail have been caught this winter in Zhejiang, a major hairtail fishing province; 30 percent more than last winter. The catch in winter usually accounts for 40 percent of total output in the province. [Text] [Beijing XINHUA in English 1507 GMT 7 Mar 80 OW]

LISHUI PREFECTURE SPRING AFFORESTATION--Lishui Prefecture, Zhejiang, has stepped up afforestation and tree planting. Over 100,000 people take part daily, and at present over 20,000 mu of land have been afforested. [Hangzhou Zhejiang Provincial Service in Mandarin 1100 GMT 6 Mar 80 OW]

CSO: 4007

END

SELECTIVE LIST OF JPRS SERIAL REPORTS

CHINA SERIAL REPORTS

CHINA REPORT: Agriculture
CHINA REPORT: Economic Affairs
CHINA REPORT: Plant and Installation Data
CHINA REPORT: Political, Sociological and Military Affairs
CHINA REPORT: RED FLAG*
CHINA REPORT: Science and Technology

WORLDWIDE SERIAL REPORTS

WORLDWIDE REPORT: Environmental Quality
WORLDWIDE REPORT: Epidemiology
WORLDWIDE REPORT: Law of the Sea
WORLDWIDE REPORT: Nuclear Development and Proliferation
WORLDWIDE REPORT: Telecommunications Policy, Research and Development

*Cover-to-cover

END OF FICHE

DATE FILMED

11 April 1980

D.D.